TECHNOLOGY DEPT.

the OIL AND GAS JOURNAL

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DETROIT

You can't make hole in hard rock with a shovel!

You can't penetrate such formations with a shovel or scooping action. You need a sharply concentrated blow such as a pick gives. That's why the Hughes Hard Rock Series of Rock Bits makes faster hole in *hard drilling*. These Hughes bits are especially designed so the teeth concentrate the available load on the bottom of the hole, with hundreds of impact blows per revolution. In this way, the compressive strength of the formation is constantly exceeded and the bit makes steady progress.

Important too—in hard rock, a minimum of scraping action means added tooth life—(extra footage).

This special attention to individual drilling conditions and formations is why Hughes Rock Bits consistently make more hole faster in every type of stratum. To get the fastest penetration possible, use the Hughes bit *designed* for the particular formation you are running in. Your Hughes field man will gladly help you choose the right bit.

HUGHES
TOOL COMPANY
HOUSTON, TEXAS
WORLD STANDARD
OF THE INDUSTRY

HUGHES TRI-CONE ROCK BITS

PRICE 50 CENTS TABLE OF CONTENTS PAGE 49 **DECEMBER 7, 1950**

XUM

greetings!
HOWCO
from HALLIBURTON
greetings

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The ALL-BETHLEHEM DRILLING BARGE

This all-Bethlehem drilling barge, complete in every detail, was towed to location immediately after commissioning ceremonies.

Today's best answer to the problem of purchasing a rig for shallow-water drilling

In previous years, the building and equipping of drilling barges often meant endless confusion and mixups—the net result being a troublesome, makeshift job in many important respects. But that necessary evil became a thing of the past with the advent of the all-Bethlehem drilling barge—an outfit created 100 per cent by *one* experienced builder, completely responsible for every detail.

In an all-Bethlehem drilling barge, the drilling equipment is furnished by Bethlehem Supply, one of the world's great manufacturers of rotary outfits; the barge is planned, designed, built, and equipped by Bethlehem's Beaumont shipyard. From the blueprint stage to final delivery, every move of both company units is completely coordinated. Gone are the complications that so often result from dealing with ten or twelve companies on the same building job.

One great advantage, of course, is the centralized responsibility—*ours*. Bethlehem alone answers to the customer and answers for everything. Another, perhaps even greater advantage, is the positive assurance of a well-built, thoroughly modern outfit—one that is all piped up, complete in every detail, ready for work when it leaves the yard.

Our engineers will gladly discuss details with oil companies or contractors whose program includes shallow-water drilling. For full information, call Bethlehem Supply or the Bethlehem Beaumont, Texas, yard.

BETHLEHEM STEEL

BETHLEHEM SUPPLY COMPANY

GENERAL OFFICES: 21 E. SECOND ST., TULSA, OKLA.

BETHLEHEM STEEL COMPANY

Shipbuilding Division

GULF COAST YARD: BEAUMONT, TEXAS

Subsidiaries of Bethlehem Steel Corporation

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"Amazing," cried Crockett, "such development I've never seen!"

In the past 50 years the Southwest has emerged from an obscure position in the commercial world to one of the great industrial centers of the country.

Vast natural resources, assured low-cost power, and central location continue to attract new businesses each day.

Brown & Root offers you experienced counsel, backed by more than thirty years of successful engineering and construction in this great Southwest. Its complete knowledge of soil, terrain, people, and climatic conditions will result in faster, more economical completion of your contemplated project. A request from you will put Brown & Root consultants at your service.

BROWN & ROOT, Inc. *Engineers • Constructors*

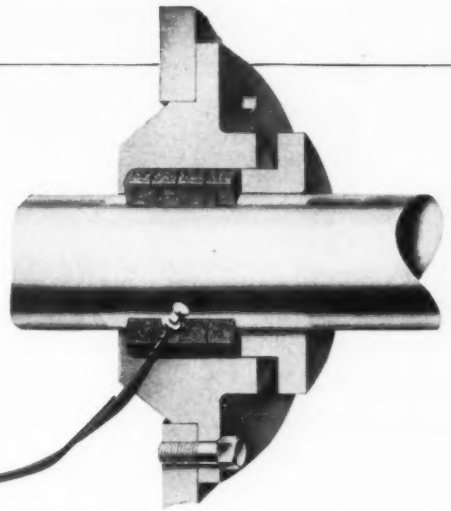
P. O. BOX 3, HOUSTON

CABLE ADDRESS — BROWNBILT

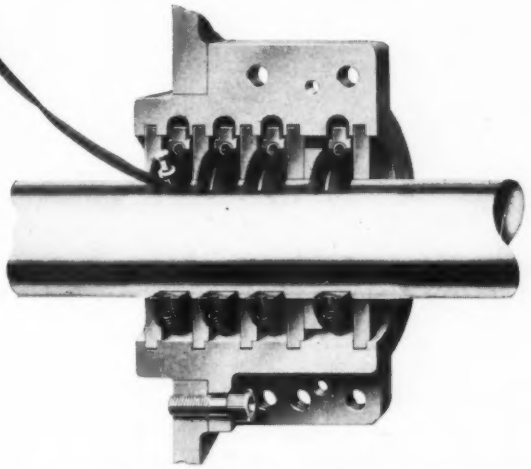
Associated Companies — BROWN ENGINEERING CORP. — BROWN & ROOT MARINE OPERATORS, INC.

COPPUS TURBINES

offer you a choice of packing rings



STANDARD METALLIC RING PACKING — Made of high grade asbestos cores encased in specially treated lubricated aluminum foil. Recommended as a low-friction, long-service packing for steam temperatures up to 850 F and back pressures up to 50 lb. Adjustable packing glands keep leakage at minimum. Easy access to packing rings.



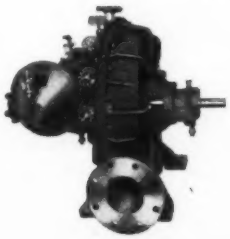
OPTIONAL CARBON RING PACKING — Consists of three carbon packing rings on the pressure side and one beyond the leak-off section. Each ring has three segments held together by a stainless steel garter spring. For back pressures up to 75 lb. Standard for vacuum or gas operation, or when leak-off is desired.

Heavy chrome plating on shaft at stuffing box is common to both types of Coppus packing.

Coppus Turbines ranging from 150 hp down to fractional in 6 frame sizes

FIT TURBINE COSTS TO HORSEPOWER NEEDS

When you buy turbines rated close to your exact horsepower needs, you save plenty of money. That's because turbines are generally priced in proportion to their size. The wide range of sizes of Coppus Turbines promises purchasing economy for you from the 150 hp size down to the smallest. As for operating and maintenance economies, you get them, too, from such other features as: greater number of manually operated valves for individual control of steam nozzles; replaceable cartridge-type bearing housings and others. For complete details . . .



WRITE FOR BULLETIN 135
COPPUS ENGINEERING CORPORATION
273 Park Avenue
Worcester 2, Mass.
Sales offices in THOMAS' REGISTER

COPPUS "BLUE RIBBON" TURBINES

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Only **ONE** *can bear this famous name!*

Copying the Spicer Universal Joint appearance is easy enough. And commonly done. But no one else can put *into* a joint the priceless combination of ingredients, know-how and lore that makes the Spicer unit so individual . . . so exclusive in features . . . so outstanding in performance.

No other universal joint has behind it the 46-year experience of Spicer. No other engineering staff is so generously manned with competent joint-designing skill. No plant has such a big investment in universal joint production and testing equipment as Spicer. With so many features that cannot be duplicated, is it any wonder that Spicer Universal Joints are the "Standard of the Industry?"

46 YEARS OF **Spicer** SERVICE

SPICER MANUFACTURING
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TRANSMISSIONS • PASSENGER CAR AXLES • CLUTCHES • PARISH FRAMES • RAILWAY GENERATOR DRIVES
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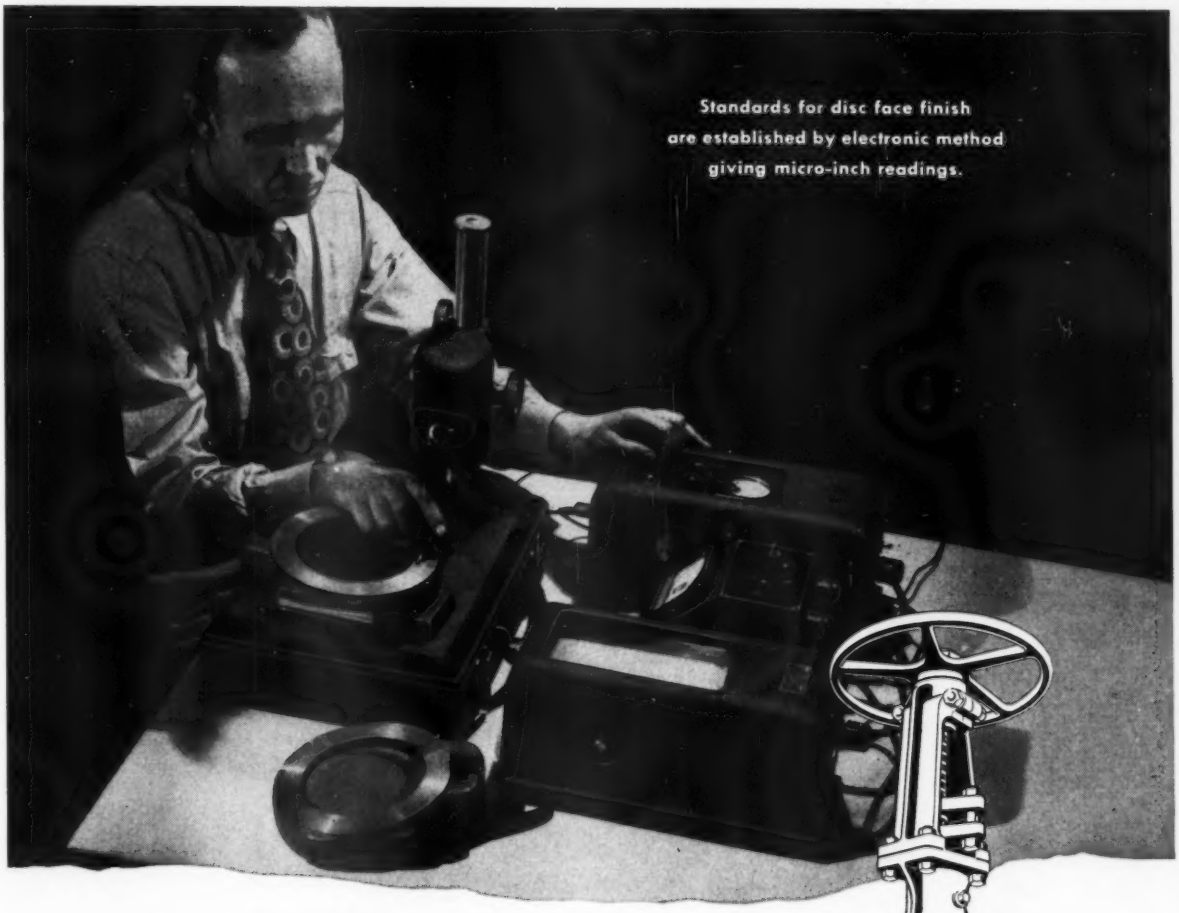
More **CRANE VALVES** are used than any other make



How CRANE controls quality to the Micro-Inch to cut your valve costs

Surface finish of a valve's working parts has a lot to do with its wear resistance and operating efficiency. A correct finish means a tighter-seating valve, easier operation, greater ease of maintenance. In Crane Quality valves, the surface finish of machined parts is measured and controlled to rigid limits. The standards for quality control of surface finish are determined by the most scientific methods as shown above. Yes, nothing is overlooked to make Crane Valves the lowest-cost valves in the long run. *That's Crane Quality!*

Precise quality control of materials, design, and manufacturing—to the highest degree in the industry—makes Crane valves the lowest cost valves in the long run. On steam service, oil and oil vapor lines, for example, you'll find Crane Steel Gate Valves a sure remedy for high maintenance costs. Talk it over with your Crane Representative.

CRANE VALVES

CRANE CO., *General Offices:* 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1950

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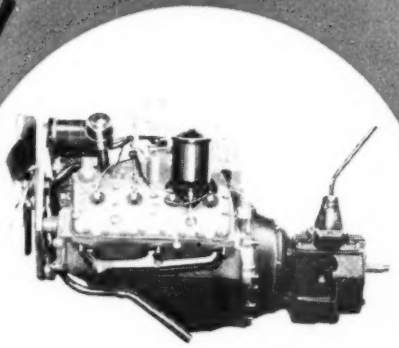
RIGHT 3 WAYS!

1 **RIGHT POWER** for your job... five great engines in the Ford Industrial Engine line. Available as complete power units or engine assemblies—both with a variety of attachments.

2 **RIGHT FEATURES.** Ford Industrial Engines and Power Units incorporate the newest advancements of Ford's famed progressive engineering.

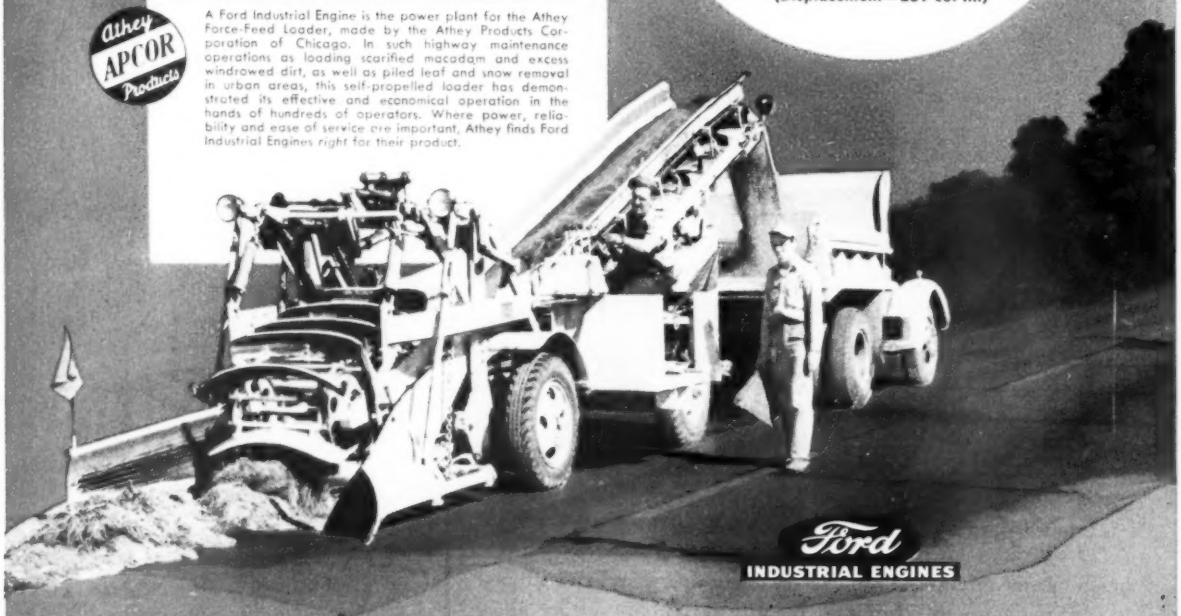
3 **RIGHT SERVICE**—as near as your Ford Dealer, clear around the world!



Ford 239 V-8 Industrial Engine, with four-speed transmission. (Displacement—239 cu. in.)

Athey APCOR Products

A Ford Industrial Engine is the power plant for the Athey Force-Feed Loader, made by the Athey Products Corporation of Chicago. In such highway maintenance operations as loading scarified macadam and excess windrowed dirt, as well as piled leaf and snow removal in urban areas, this self-propelled loader has demonstrated its effective and economical operation in the hands of hundreds of operators. Where power, reliability and ease of service are important, Athey finds Ford Industrial Engines *right* for their product.



Ford INDUSTRIAL ENGINES

● For the *right* power, pick Ford! Five models from which to choose—a Four with 120 cu. in. displacement . . . two Sixes—226 cu. in. and 254 cu. in. displacement . . . two V-eights—239 cu. in. and 337 cu. in. Available both as engine assemblies and complete power units. Completely new, and completely right for farming . . . construction . . . power generating . . . material handling . . . pumping . . . lumbering, many other applications. Write today for specifications.

See your nearest Ford Dealer, Ford District Sales Office, or write direct to

INDUSTRIAL ENGINE DEPARTMENT

FORD MOTOR COMPANY

Dearborn, Michigan

YOUR JOB IS WELL-POWERED WHEN IT'S FORD-POWERED

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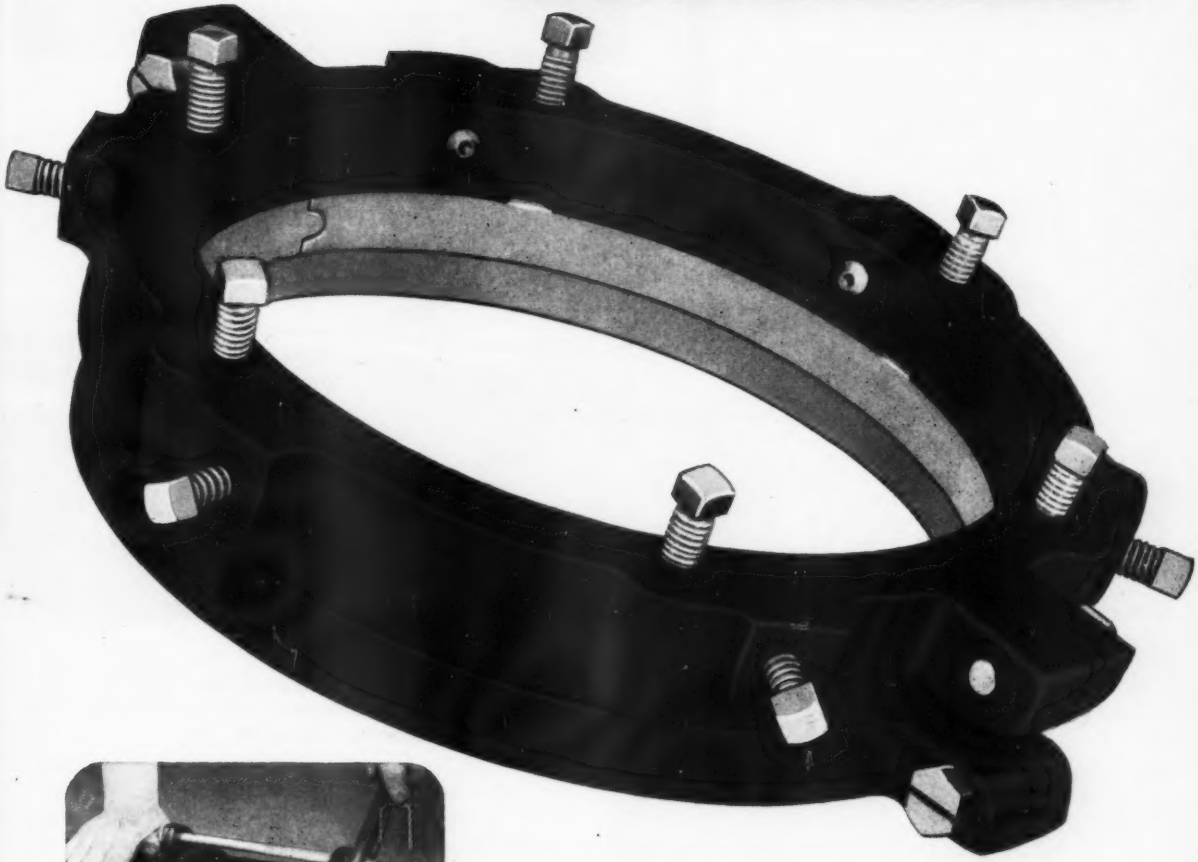
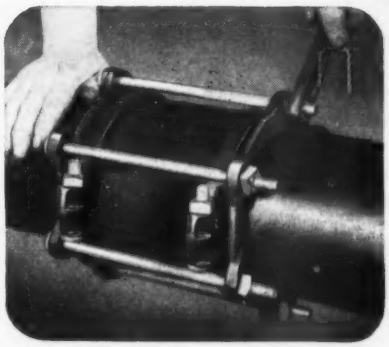
FOR THREAD LEAKS AT FITTINGS





FOR EVERY TYPE OF COLLAR LEAK

SKINNER-SEAL COLLAR LEAK CLAMP, with its sealed gasket and massive construction, stops every type of collar leak.

SKINNER-SEAL PIPE JOINT CLAMP stops leaks at joints where pipe is screwed into a fitting. Any temperature — pressures up to 2,000 pounds. A permanent repair — it saves the cost of tearing out and renewing leaky fittings. Prevents shut-downs. In universal use for over half a century. In stock at all Oil Well Supply Stores!

M. B. SKINNER COMPANY, SOUTH BEND 21, IND., U. S. A.

PIPE JOINT CLAMP
COLLAR LEAK CLAMP

SKINNER-SEAL

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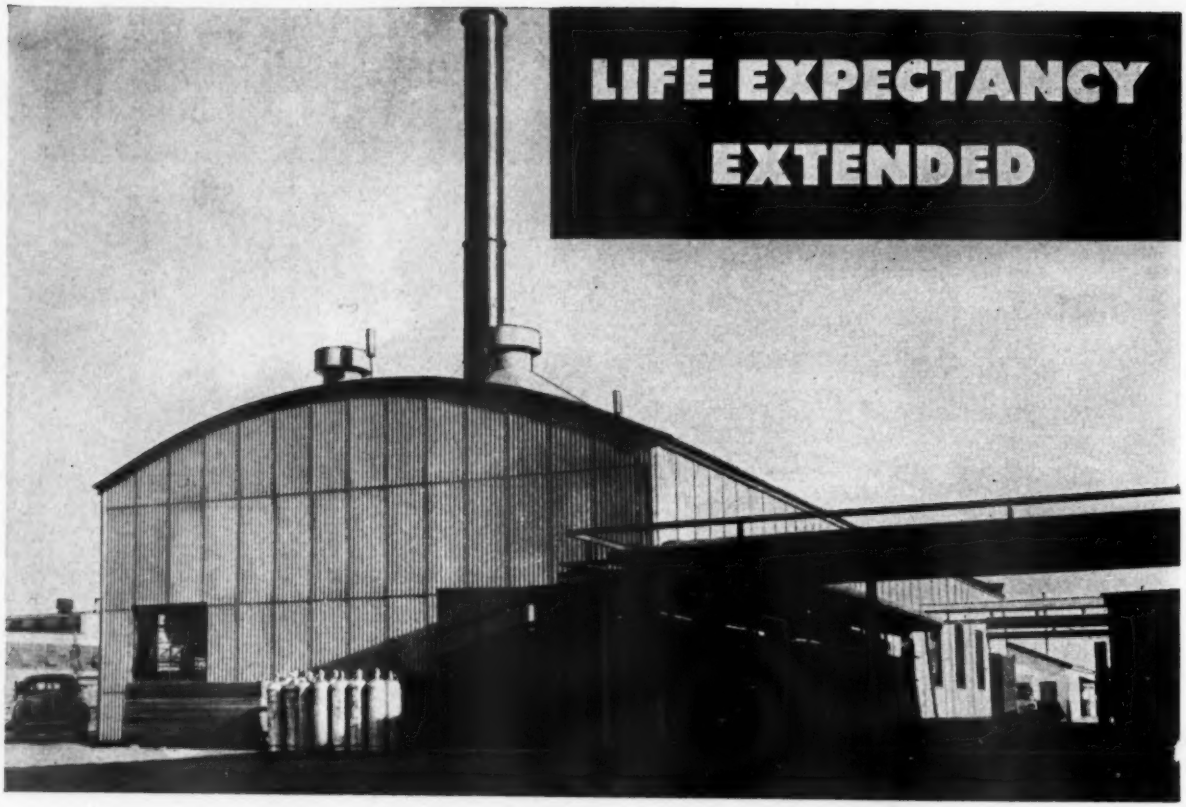

by K&M "Century"®
ASBESTOS CORRUGATED

Compressor Room of the Birds Eye-Snider Plant at Walla Walla, Washington, is sided with K&M "Century" Asbestos Corrugated Sheets.

The sturdy "clean build" of these compressor plant walls is one sign they'll live long. They're K&M "Century" Asbestos Corrugated, the material you see on more and more industrial and commercial buildings whose owners have made sure of lasting good looks and economy.

K&M Corrugated saves from the start by simplifying and speeding erection. Cutting, drilling, fitting and anchoring are easily done, with every assurance of trim, durable enclosure. What's more, K&M Asbestos Corrugated Sheets—*stay put.* They don't give in to weather effects and fire hazard, nor to rust, rot, rodents and termites. Thus long-term freedom from maintenance goes right along with the initial economy of using K&M "Century" Asbestos Corrugated for siding and for roofs, too.

Whatever your building plans, see how much this adaptable modern material can save you. Write us for full data and the name of your nearest K&M Distributor.

Even scaffolds and extra labor are eliminated when "TOP-SIDE"* fasteners are used. They are made for use with steel members of any type, on sides and roofs.

*® H. & B. Enterprise Corp.

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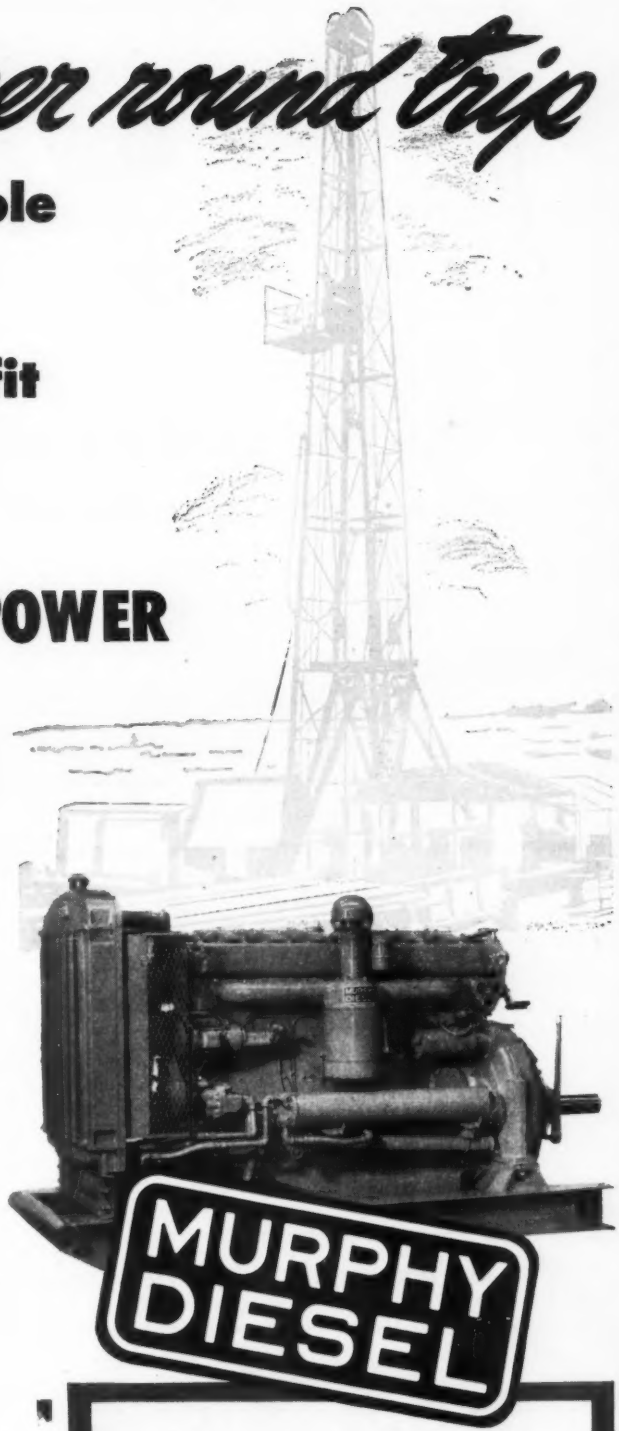
K&M best in asbestos ®

Less time per round trip

means more hole per day and more profit for you with

MURPHY DIESEL POWER



WHEN you have Murphy Diesel Power on the end of a string of pipe, you have the kind of power that really takes hold and gets the pipe out in a hurry . . . and that means you'll make more hole in less time. The key to Murphy's responsiveness to power demands is its hydraulic servo-type governor in combination with such features as "true" diesel operation . . . unit fuel injection . . . four valves per cylinder . . . and many others.

Equally important is the Murphy Diesel's dependability and operating economy—it stays on the job longer and costs less per hour to operate.

The 36 page booklet *"10 Questions to Ask a Diesel Engine Salesman"* explains fully the advantages of Murphy Diesel design and what it can mean to you. Ask your Murphy Diesel Dealer for a copy or write direct.

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Ed Meyer Tractor Co.
Kilgore, Texas
B & G Engine Service
Los Angeles, Cal.
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Or See Your Nearest Dealer

Heavy duty power
for the oilfields

Murphy Diesel Engines and Power Units in 24 models for drilling and pipe line pumping, 1200 and 1400 RPM, 90 to 220 H.P., Diesel Electric Generator Sets 60 to 133 K.W.

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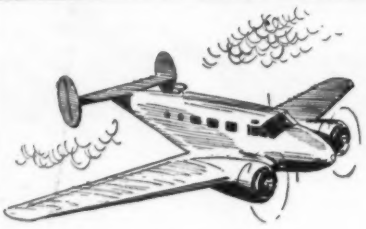
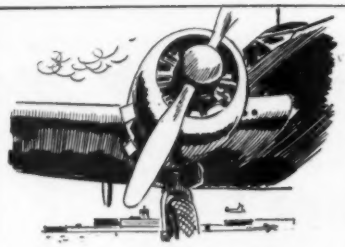


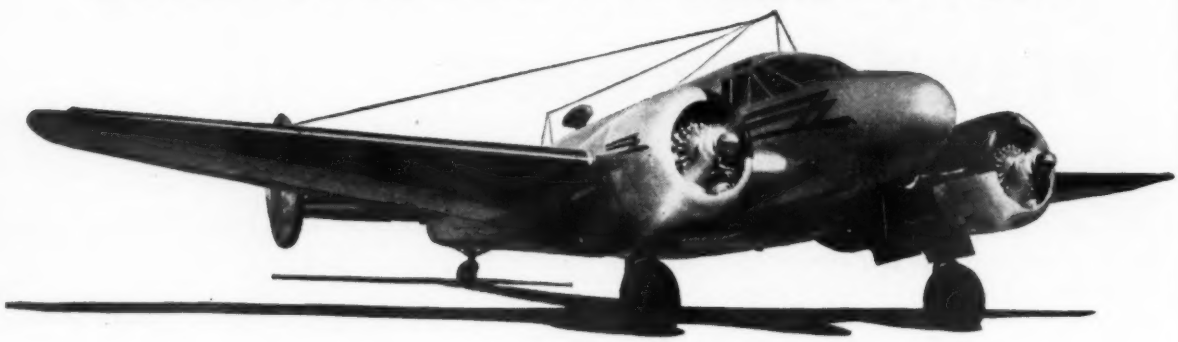
Choose it for speed and performance. With a maximum speed of 230 mph, you're in a class with the Airlines — and you have unsurpassed mobility of action, too.



Choose it for safety. Twin-engine reliability and outstanding single-engine performance provide an assurance of mental ease when flying in less favorable weather conditions.

Choose it because it has proved itself. Wartime versions rolled up hundreds of millions of miles. Today, more than 500 postwar Beech "Twins" are serving leading industries.

For the ultimate in air transportation choose the Beechcraft Executive Transport



Features place the Model D18S in a class by itself

200-mph cruising speed
Rate of climb at sea level, 1,200 feet per minute
Range up to 900 miles
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Custom seating arrangement for 7, 8, or 9
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Individual reading lights, ash trays, etc.

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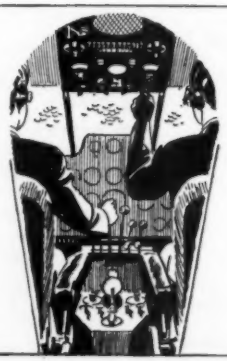
Choose it for luxury. Several custom-interior plans available. Sound-proofed cabin, restful seats, wide windows. You'll feel no travel fatigue here!



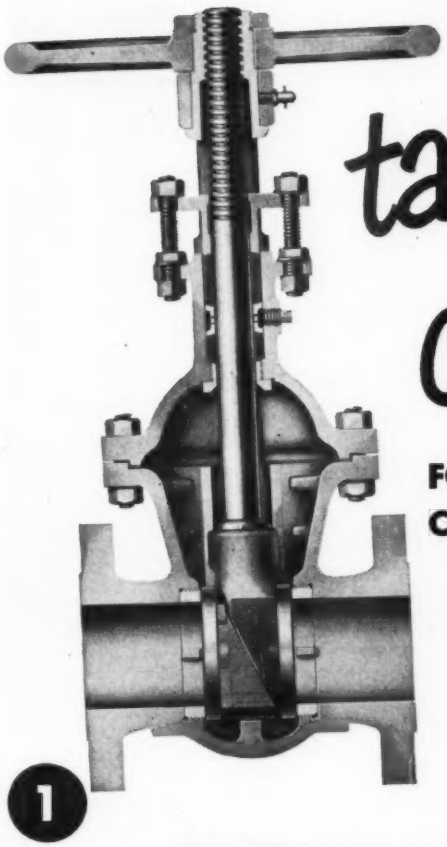
And it's the choice of pilots. Extremely efficient instrument and control layout, with major operating units conveniently located on central pedestal.

PLUS VALUES, JOB-PROVED AGAIN AND AGAIN

DARLING VALVES

take your choice...

FOR BETTER, LOWER COST SERVICE WITH DARLING cast steel gate valves



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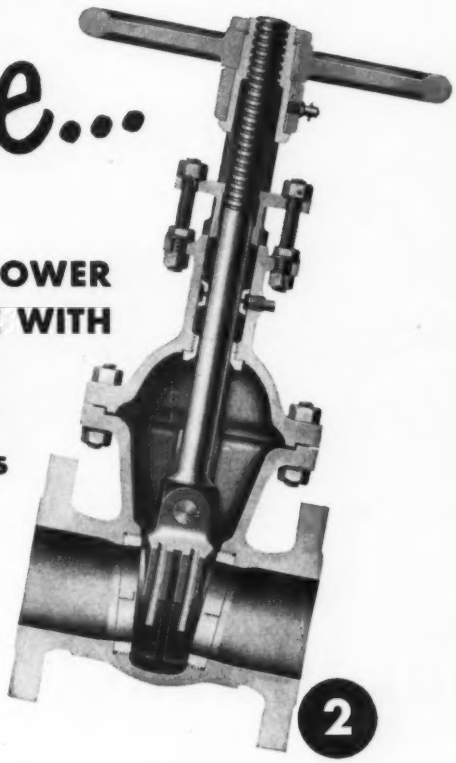


2

DARLING VALVES FOR EVERY NEED

Darling gate valves are made in a wide range of sizes, types and constructions for all kinds of normal and unusual service . . . and for pressures up to 1500 pounds.

IN addition to gate valves of solid wedge design, Darling offers two other types. Both have distinctive features that prolong valve life while minimizing down time and maintenance. They're great time and money savers! . . .

1 This view shows a Darling gate valve of the fully revolving, double disc, parallel seat type. Time and again users rate it the most trouble-free, best performing gate valve obtainable today. Why? Because its unique design assures: *automatic* adjustment for valve body distortion . . . positive, easy operation . . . uniform wear distribution . . . foolproof simplicity in maintenance and reassembly . . . and service life seldom if ever equalled.

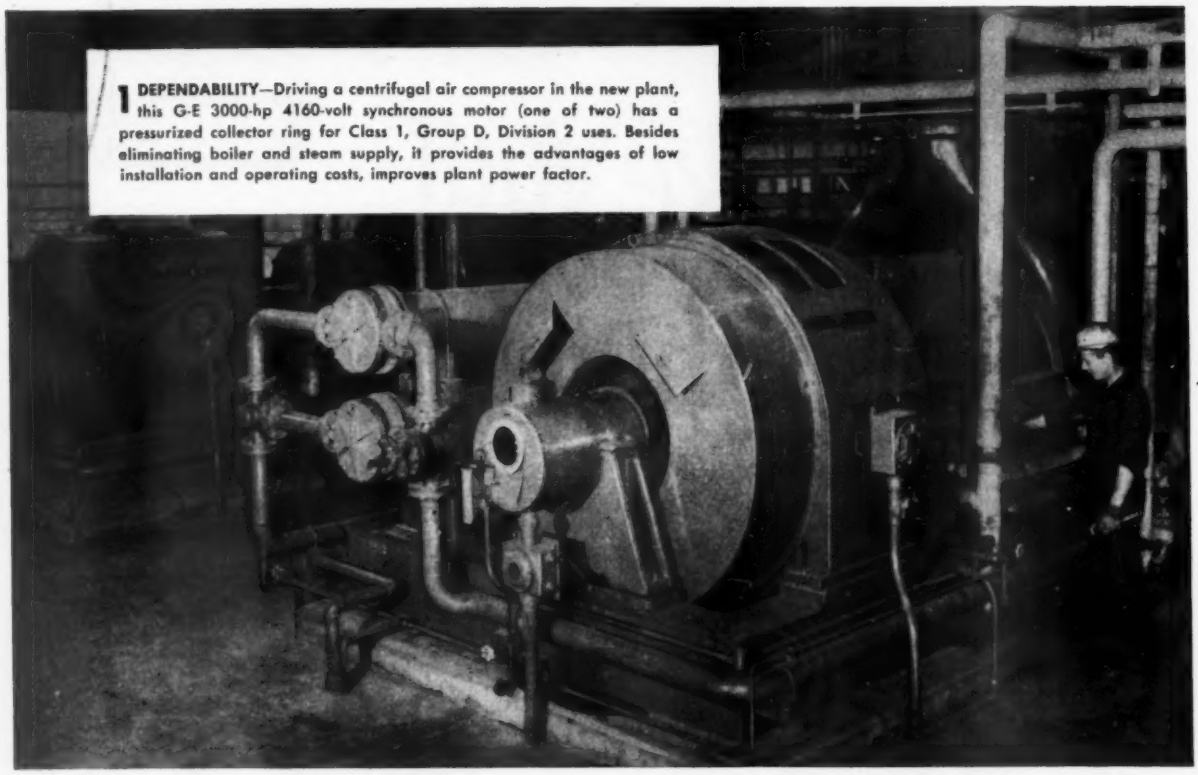
2 Take a close look at the slotted, double-grooved wedge in this cutaway view. There's little wear and tear on *these* wedge faces and seats because the slot permits compression of the wedge to compensate for valve body expansion or contraction due to temperature changes. Moreover, the double grooves, with twin guide ribs in the valve body, provide twice the usual bearing area, eliminating wedge canting and avoiding damage to the downstream seat.

SEND FOR BULLETIN

Why not get *all* the facts on these money-saving valves? Then *you* can analyze and decide whether or not you stand to gain by giving Darlings a try. Simply specify your service requirements . . . or ask for cast steel valve bulletin.

DARLING VALVE & MANUFACTURING CO.

Williamsport 1, Pa.



1 DEPENDABILITY—Driving a centrifugal air compressor in the new plant, this G-E 3000-hp 4160-volt synchronous motor (one of two) has a pressurized collector ring for Class 1, Group D, Division 2 uses. Besides eliminating boiler and steam supply, it provides the advantages of low installation and operating costs, improves plant power factor.

Cat Cracker cracks down on shutdowns with G-E drives!

Sohio's new $11,000,000 fluid catalytic cracking plant at Lima refinery goes on stream—with co-ordinated G-E equipment helping to maintain continuous, 16,000-bbl-per-day rate!

Fluid catalytic cracking—operating as it does on a continuous basis—just can't afford shutdowns of motor-driven equipment. That's why, at Sohio's new Lima plant, the natural choice was G-E motors and control. Carefully co-ordinated to work together and stay on the job, they minimize costly plant downtime, help keep output continuous!

Whatever your process needs, G.E. can match them from the most complete line of electric equipment made for refinery service, with G-E engineers to help apply it most economically. Ask your nearest G-E office about it—*early* in your planning. *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

GENERAL ELECTRIC

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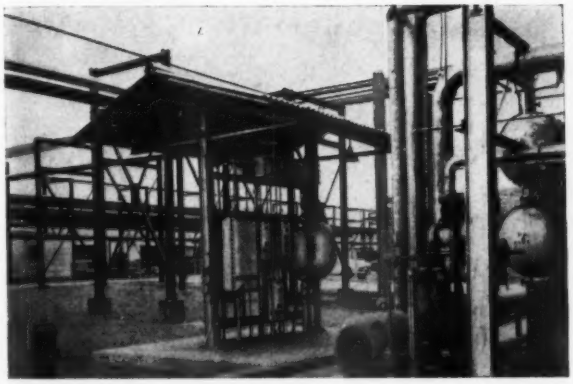
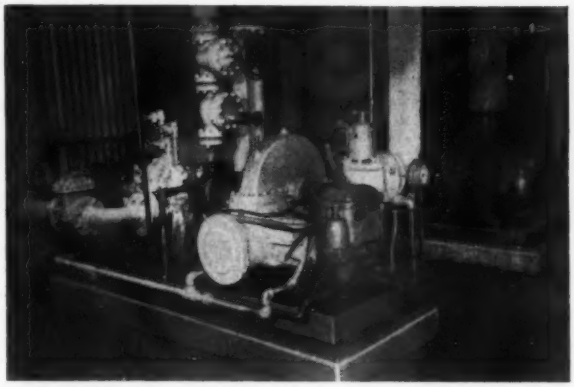
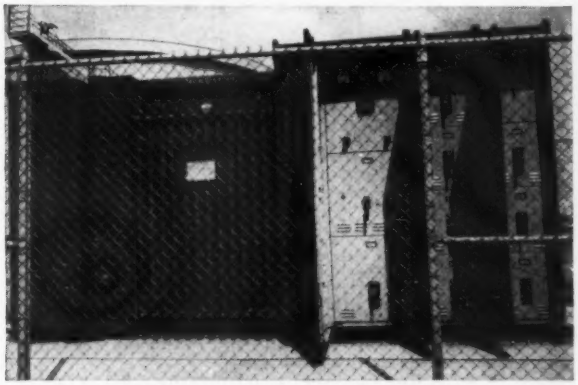


2 CONVENIENCE—A practical way to install low-voltage control in hazardous areas is to rack up an assembly of G-E combination starters and breakers, as shown here, for indoor or outdoor refinery use. They can be located close to the motors, as in this Class 1, Group D application at Sohio's new catalytic cracking plant.

3 JOB-RIGHT—Here, 7 of 14 G-E 100-hp vertical motors drive pumps that recirculate cooling-tower water. Both the motors and the G-E push-buttons mounted behind the middle motor are explosion-proof for Class 1, Group D use. G-E control for hazardous areas includes both air-break and oil-immersed types to match all G-E explosion-proof motors.



4 SELF-PROTECTED—In the pump house, this G-E Type DP mechanical drive turbine provides reliable adjustable-speed drive. Completely interchangeable spare parts plus new, standard pressure-lubrication system make these units—which operate anywhere in damp, hot, or hazardous areas—ideal for your toughest refinery applications.



5 LOW-COST POWER—In the new plant's tank field, a non-hazardous location, this G-E 750-kva outdoor load-center unit substation steps down 4160-volt power to 480 volts for use right where it's needed. These easily installed G-E units eliminate voltage drop for higher operating efficiency, cut power losses, provide flexibility for growth.

6 CENTRALIZED CONTROL—Motors driving much of the equipment on Sohio's catalytic cracking unit are controlled from a non-hazardous area, in this case the switch house, containing G-E low-voltage switchgear (left) and G-E Cabinetrol (extreme right). Made in compact, standardized units, they provide maximum personnel safety and flexibility of arrangement.

Co-ordinated ELECTRIC EQUIPMENT for Fluid Catalytic Cracking

Physical culture course for steel pipe

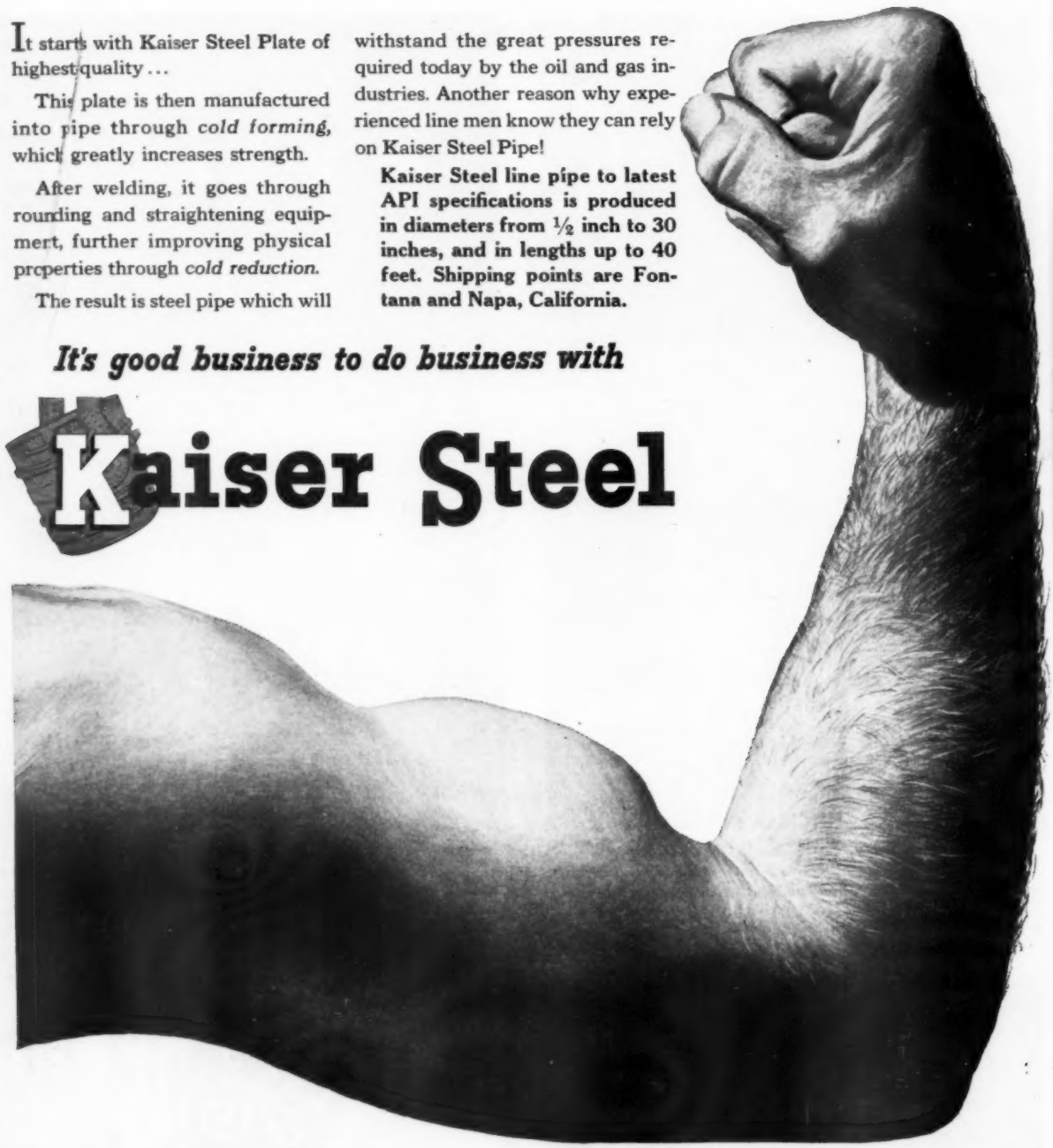
It starts with Kaiser Steel Plate of highest quality...

This plate is then manufactured into pipe through *cold forming*, which greatly increases strength.

After welding, it goes through rounding and straightening equipment, further improving physical properties through *cold reduction*.

The result is steel pipe which will withstand the great pressures required today by the oil and gas industries. Another reason why experienced line men know they can rely on Kaiser Steel Pipe!

Kaiser Steel line pipe to latest API specifications is produced in diameters from ½ inch to 30 inches, and in lengths up to 40 feet. Shipping points are Fontana and Napa, California.



It's good business to do business with

Kaiser Steel

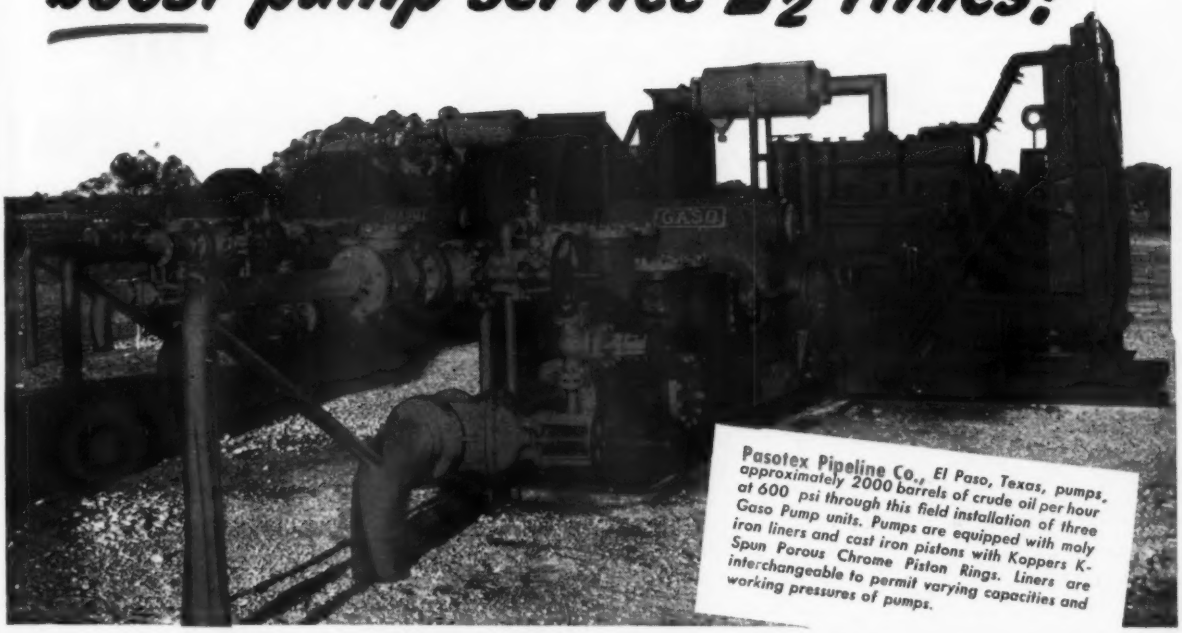
KAISER STEEL PIPE SPECIFICATIONS • All pipe manufactured to latest A.S.T.M. and A.P.I. specifications

Type	Diameter	Length	Wall Thickness	Shipping Point
Continuous Weld—Threaded and Coupled	½" to 4" nominal I.D.	Uniform 21'	Standard	Fontana, Calif.
Continuous Weld—Plain End	2⅜" to 4½" O.D.	Up to 40'	Standard	Fontana, Calif.
Electric Resistance and Fusion Weld—Plain End	8⅝" to 22" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser
Electric Resistance Weld—Plain End	5⅛" to 12¾" O.D.	Up to 55'	.188" to .400"	Fontana, Calif.
Electric Fusion Weld—Expanded—Plain End	24" to 30" O.D.	Up to 40'	.188" to .500"	Napa, Calif.—Basalt-Kaiser

Prompt, dependable delivery at competitive prices • **KAISER STEEL CORPORATION** Los Angeles, Oakland, Seattle, Portland, Houston, Tulsa, New York

KOPPERS K-SPUN POROUS CHROME* RINGS

boost pump service 2½ times!



Pasotex Pipeline Co., El Paso, Texas, pumps approximately 2000 barrels of crude oil per hour at 600 psi through this field installation of three Gaso Pump units. Pumps are equipped with moly iron liners and cast iron pistons with Koppers K-Spun Porous Chrome Piston Rings. Liners are interchangeable to permit varying capacities and working pressures of pumps.

GASO PUMP CO. *Cuts* cylinder wear—*Doubles* pump service—*Slashes* maintenance costs—with KOPPERS Piston Rings

Here's a job that's really hard on pumps—and piston rings! Thousands of barrels of pipeline crude oil go through these rugged Gaso Pumps . . . carrying with it abrasives and other impurities that constantly grind away at cylinder walls and piston rings. But amazing new Koppers K-Spun Porous Chrome Piston Rings take this rough, tough service right in their stride . . . *lasting more than twice as long as ordinary rings!* And that's not all . . . Koppers Rings *decrease cylinder wall wear up to 50%* in the bargain!

Here at last are the piston rings that cut "*down time*" and maintenance costs *in half* . . . lengthen the life span of expensive equipment . . . boost production and profits to a new high! Check into the operating costs of *your* equipment today . . . and next time you overhaul, specify Koppers Piston Rings . . . then watch costs go *down,* service go *up!*

Koppers complete engineering facilities are at your service. Whatever your piston ring problem may be, we're equipped to help you solve it quickly and economically. Write for information to: KOPPERS COMPANY INC., *Piston Ring Department,* 1652 Hamburg St., Baltimore 3, Maryland.

*Van der Horst process

WHAT IS KOPPERS K-SPUN?

Koppers K-Spun is an entirely new type of ring iron created by an exclusive centrifugal casting process, which forms graphite into large nodules instead of fine flakes. Large graphite nodules in K-Spun cast iron eliminate the many planes of weakness inherent in ordinary cast iron . . . impart to K-Spun *100% more strength, 50% more elasticity, four times more shock resistance!* K-Spun Rings are guaranteed not to break in installation or in service! Available up to 12⅛" diam.

WHAT IS KOPPERS POROUS CHROME?

Koppers Porous Chrome is a chrome-plated ring with a *porous surface* that holds and distributes oil during break-in, quickly wears down to perfectly seated *solid chrome* that prevents grit or other particles from imbedding themselves in the ring surface and scratching cylinder walls. Porous Chrome Rings last up to four times as long as ordinary rings, reduce cylinder wear 50% or more! Available in any size on specification in quantities of 100 or more.

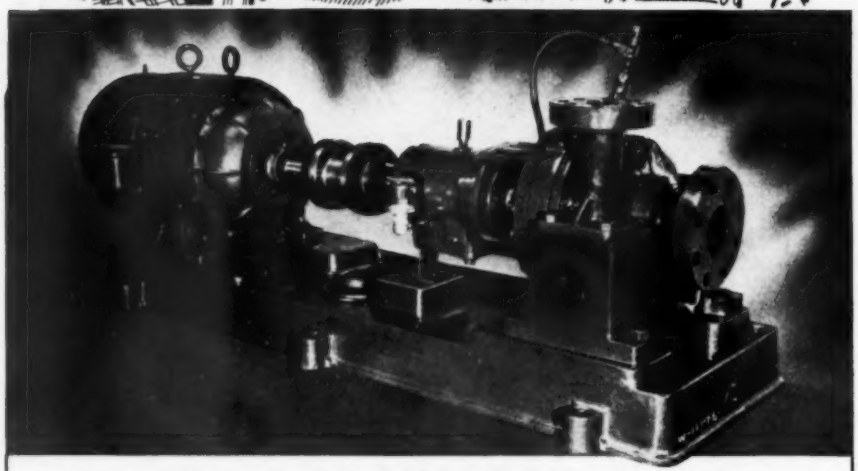
KOPPERS

KOPPERS *American Hammered* PISTON RINGS

They ALL Go For

THE TYPE HM!

Worthington's New Process Pump a Hit With Refinery Men, From Operators to Management



A TRULY VERSATILE PROCESS PUMP! The Worthington Type HM Centrifugal is available with conventional packed box or mechanical seal, in capacities up to 650 gpm, heads up to 475 ft. and in a wide choice of materials — cast iron, bronze, stainless steel, carbon steel and Worthite.

Seldom has any pump received so hearty a welcome at all levels of refinery organization as Worthington's Type HM.

Operators like its ruggedness and thorough dependability

Storekeepers find its maximum interchangeability of parts saves time

Maintenance men praise its quick adaptability to either a packed stuffing box or mechanical seal, its spacer type coupling that allows removal of the rotor assembly without disturbing piping or driver, and its over-all simplicity of construction that assures such easy inspection and repair

Engineers and power plant men are impressed by its correct hydraulic and mechanical design, low NPSH and power requirements, and sustained high efficiency

Management realizes that the long life, low cost upkeep and versatility of the Type HM mean a first class capital investment for present and future process pumping

GET ALL THE FACTS

Contact our nearest District Office or write direct for Bulletin W-341-B14 Learn why the Type HM is still further proof that *there's more worth in Worthington*

Worthington Pump and Machinery Corporation, Centrifugal Pump Div., Harrison, New Jersey

SEE OUR CATALOG IN THE COMPOSITE CATALOG

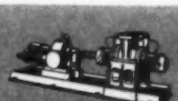
MEMBER

THE WORLD'S BROADEST LINE ASSURES YOU THE RIGHT PUMP FOR EVERY JOB

WORTHINGTON

CO-3

Types HR and HB. Twenty sizes. Capacities up to 1800 g.p.m. Developed heads up to 900 ft. Proper selection of material permits use for temperatures far below zero to 800°F., for pressures from high vacuum to 750 lb. per sq. in. gauge.



Type HD. Hydraulically-balanced, double-suction impeller handles boiling liquids with low subversence. Capacities range from 600 to 3200 g.p.m. at heads up to 700 ft., temperatures up to 850°F., pressures up to 550 lb.

Type WM. High-pressure, high-temperature, centrifugal hot-charge pumps. Twelve distinct points of superiority, based on years of experience building pumps for high pressure and temperatures. Capacities to 2000 g.p.m., heads to 5000 ft.

Type ML. Several construction arrangements permit flexibility in application. Designed for temperatures up to 225°F., or higher with water-jacketed stuffing box. Capacities up to 1600 g.p.m., heads to 900 ft.

Design and construction of industrial buildings call for detailed planning. Although defense requirements restrict the supply of Alcoa Industrial Building Sheet, Alcoa is not limiting its engineering assistance to designers and erectors. That is the reason for this message.

Easy to handle, Alcoa Industrial Building Sheet goes up fast, eliminates painting costs and time.

Before you plan another building... get these facts on Aluminum!

Today, when man power shortages call for every worker to be engaged in production, plant managers appreciate, more than ever, the extra worth of buildings clad in maintenance-free Alcoa Industrial Building Sheet.

All the data you need to design and erect buildings using Alcoa Industrial Building Sheet have been assembled in this useful, new booklet. Mail the coupon today for your free copy. For price and delivery information, call your local distributor or Alcoa Sales office. You'll find them listed under "Aluminum" in your classified telephone directory. ALUMINUM COMPANY OF AMERICA, 1468M Gulf Building, Pittsburgh 19, Pennsylvania.

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EYES that see 5 MILES AWAY!

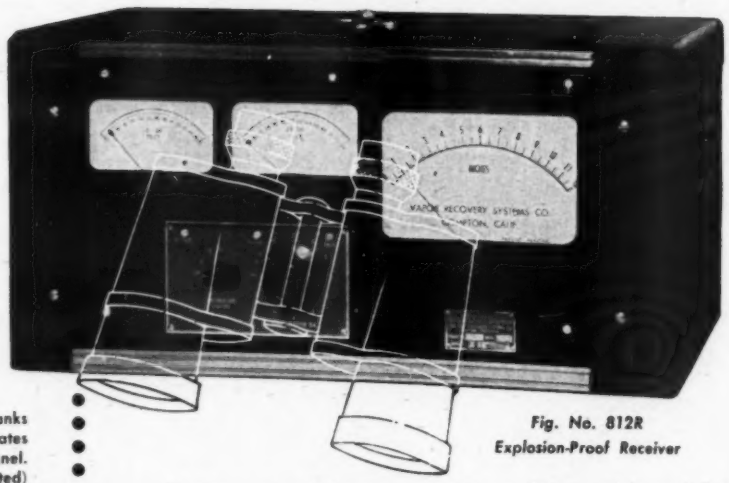


Fig. No. 812R
Explosion-Proof Receiver

FEATURES

SAFE . . . No climbing slippery tanks during wet or icy weather—eliminates toxic gas hazard for personnel. *Explosion-proof* Receiver (illustrated) designed in accordance with standards for industrial control equipment as used in hazardous areas. Transmitter's electrical section completely isolated from tank vapors. Built to meet requirements of explosion-proof equipment.

ACCURATE . . . Accuracy is only limited by type of float gauge used. Measures liquid levels to ±1/16th inch with "VAREC" 253 Series Automatic Tank Gauges.

ECONOMICAL . . . Low initial cost; low installation cost; low maintenance cost. Pays for itself in manhours saved.

EASY TO USE . . . No waiting to take readings—you need only select the tank for a momentary or continuous accurate gauge reading. Instruments do not require resetting after power shutdown.

TROUBLE FREE MAINTENANCE. Designed to operate many years without service. Electronic elements function at ½ to ½ rated capacities. Plug-in parts easily replaceable.

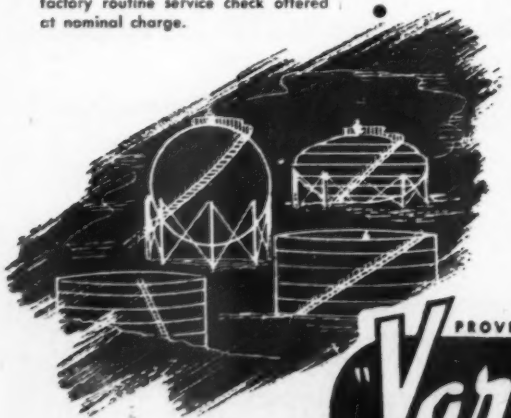
INSTALLATION AND SERVICE POLICY. Engineering supervision of installation is available. Annual or biennial factory routine service check offered at nominal charge.

Accurate Remote Reading Liquid Levels with the "VAREC" Electronic Gauger

No magic, but "VAREC'S" application of the science of electronics to the problem of tank gauging is now giving users the utmost in safety, convenience and accuracy in obtaining liquid levels at a distance from their tanks.

The "VAREC" Electronic Gauger Receiver illustrated is the multi-tank *explosion-proof* model on which you can gauge any one of 24 tanks by a twist of your fingers. Power is on only at the tank being gauged. Behind the front panel, all electrical components and wiring are enclosed in an explosion-proof housing. Wire count to the tanks is less than that of any other remote gauging system and wire size is smaller due to the low current used.

Investigate this "VAREC" Electronic Gauger for your own gauging problem. Write today for a copy of "Remote Gauging at its Best!" and call in a "VAREC" Representative.

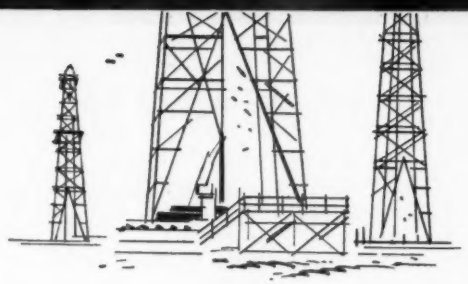


P-15

PROVED and APPROVED "Varec"

THE VAPOR RECOVERY SYSTEMS CO.
COMPTON, CALIFORNIA, U. S. A.
Cable Address: VAREC COMPTON USA (All Codes)
New York • Boston • Pittsburgh • Chicago • Detroit • St. Louis • Houston
Tulsa • Casper, Wyo. • Provo, Utah • Los Angeles • San Francisco • Seattle

Where safety depends on STRENGTH...



...it pays to depend on ALLOY STEEL!

● For safety of men and equipment, blowout preventers must be as tireless as the relentless pressures which strive against them. For that reason, these massive safety devices are made largely of extra strong, extra tough alloy steels.

Their *high resistance to fatigue* enables alloy steels to overcome the ever-present threat of oil well fluids geysering wildly out of control. *Resistance to corrosion* keeps them at their safety post twenty-four hours a day, day after day. Their *hard working surfaces* help fittings and unions hold a leak-proof seal, while *uniform response to heat treatment* allows engineers to select the safest combination of hard surfaces and tough cores.

Throughout the oil fields—wherever safety demands tough, strong, long-lasting parts—it pays to depend on Republic Alloy Steels.

Through its unique 3-Dimension Metallurgical Service, Republic—world's largest producer of alloy and stainless steels—offers you the services of experienced field metallurgists. These men, backed closely by laboratory and mill staffs, provide prompt, helpful assistance in properly applying cost-cutting alloy steels to your own safety requirements.

Write, wire or phone *today*.

REPUBLIC STEEL CORPORATION
Alloy Steel Division • Massillon, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

Republic ALLOY STEELS

REPUBLIC STEEL

Other Republic Products include Casing—Tubing—Line Pipe—Upson Studs, Bolts, Nuts and Rivets—Electrunite Boiler Tubes

Half Section of Surwel Multishot Surveying Instrument

ACCURATE SURVEYS

Before Reconditioning

PAY DIVIDENDS

With current heavy demand for crude oil and high prices, now is the time to rework those old wells for increased profits! And the first step in such a program should be the accurate determination of well inclination and bottom-hole position by a complete survey.

This can be done quickly and economically with Surwel (Gyroscopic) Multishot Surveying Service which is widely used to survey both new and old, cased or open holes.

The patented Surwel Surveying Instrument provides permanent photographic records of the inclination and direction of the hole at any depth.

It is self contained, operates automatically at pre-set short time intervals both going in and coming out of the hole. Records are obtained by camera which photographs the direction of the gyroscopic indicator and the degree of inclination. The correct course of the well can be plotted from this information and the customer is furnished with the sustaining data.

A complete survey unit with trained operators is ready to serve your needs.

WRITE, WIRE OR TELEPHONE OUR
NEAREST SERVICE POINT FOR COMPLETE INFORMATION

★SURWEL SERVICE ★SYFO CLINOGRAPH ★E-C INCLINOMETER ★NON-MAGNETIC DRILL COLLAR

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SPERRY-SUN WELL SURVEYING COMPANY

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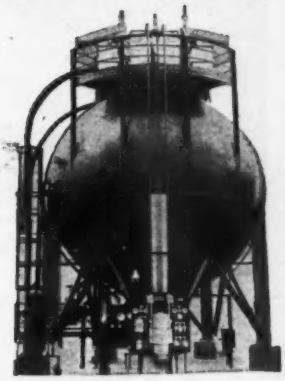
Petreco Desalting



assures maximum salt removal

which
results in
these operating
advantages...

Less crude furnace plugging
Less heat exchanger plugging
Less corrosion in topping unit

These operating advantages directly benefit the topping unit, gaining

An increased service factor
Higher temperatures to the tower
Higher charging rates
Longer runs

Also benefited is the cracking unit, mainly by

Less plugging in the reduced crude furnace

This benefits the unit by permitting

Higher temperatures from the reduced crude furnace
Longer tube life, fewer replacements
Longer runs

PETRECO MAKES SURE THAT YOU GET THE BENEFITS OF MAXIMUM SALT REMOVAL BY MAINTAINING A SERVICE ORGANIZATION WITH PERSONNEL, FACILITIES AND KNOW-HOW UNEQUALLED IN THE DESALTING FIELD

If you are charging salty crudes, and looking for some short cuts to more economical operations – get in touch with

PETROLEUM RECTIFYING COMPANY

5121 So. Wayside Drive, Houston 1, Texas
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PETRECO

SPECIALIZED *Electric* PETROLEUM PROCESSES { **DESALTING** / **DEHYDRATING**

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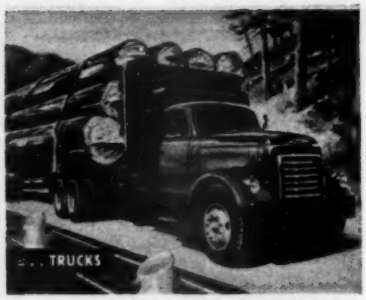
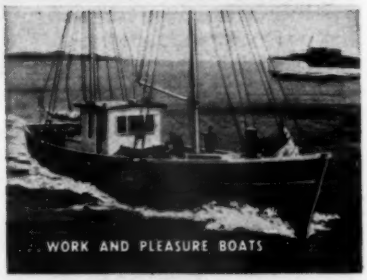


This is the Diesel

that speeds the big jobs



HERE IT IS—the newest member of the General Motors Diesel family—the brawny 6-110 engine that develops 275 horsepower.

It is 50% more powerful than the famous 6-cylinder GM "71" engine that powers so many trucks, buses, boats, construction equipment and other mobile, portable and stationary units.

This rugged new Diesel doesn't care what's tied to its tail. It has power to spare to keep big jobs humming, yet is so compact it doesn't hog space.

For example, each new Budd RDC rail car is driven by a pair of 6-110 Diesels with GM torque converter transmissions. The compactness of these power plants permits mounting them under the floor so that no revenue space is lost. These rail cars accelerate from standstill to 44 miles per hour in just one minute and have a top speed of 83 mph with a full load.

Like all other GM Diesel engines the 6-110 is two-cycle—delivers power on every piston downstroke. This advanced design cuts down Diesel size without sacrificing ruggedness; it insures fuel economy, lower maintenance costs, exceptional dependability and long life.

The GM 6-110 engine provides Diesel power at its best for heavy-duty jobs—not only for rail cars but in the largest mountain-type trucks, huge rock crushers, deep-sea fishing and pleasure boats, big pumps and compressors, mining and oil field equipment. *It is an exceptionally compact Diesel for its horsepower—an engine that gives remarkably fine performance in minimum space.*

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES . . . Up TO 275 H. P. **DETROIT 28, MICHIGAN** MULTIPLE UNITS . . . Up TO 800 H. P.

GENERAL MOTORS

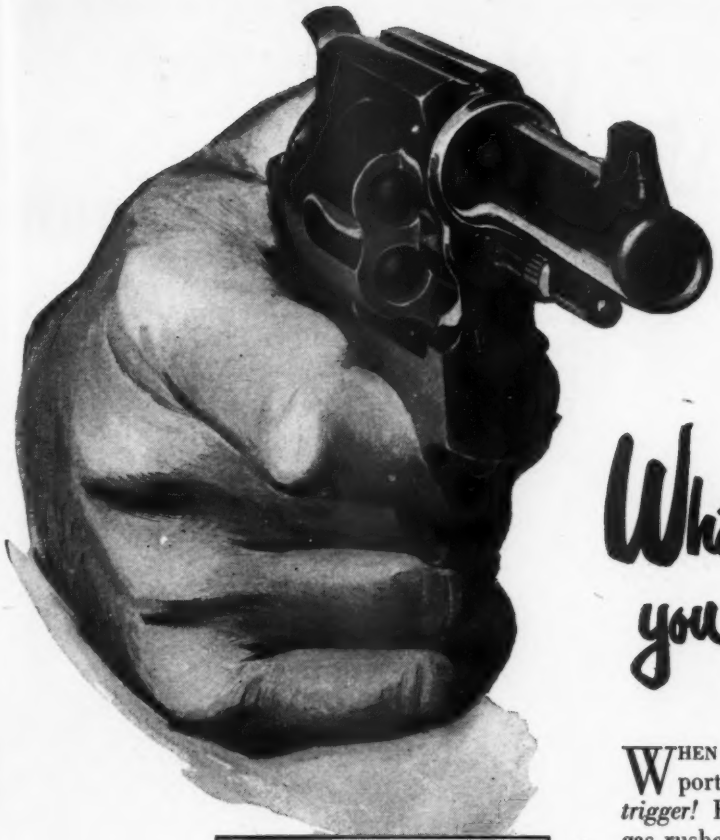
Hear HENRY J. TAYLOR on the air every Monday evening over the ABC Network, coast to coast.

GM
GENERAL MOTORS
DIESEL POWER

Only GM Diesels provide all these advantages

Compact size—less weight per horsepower . Two-cycle smoothness, power on every downstroke . Quick starting, on its own fuel . Unit injectors—no high-pressure fuel lines . Rapid acceleration . Cleaner burning . Better high-altitude performance . Easy accessibility.

"Your Key to Power Economy"



What happens when you pull the trigger?

WHEN fire strikes, just grab your *Kidde* portable extinguisher and *pull the trigger!* Flame-smothering carbon dioxide gas rushes out . . . kills fire in seconds . . . and does the job *better* because of a new, improved valve.

This improved new valve, on all portables from 2½ to 25 pound size, gives you maximum safety . . . surer, easier trigger-finger control! The valve has a pure nickel coined disc which does triple duty . . . acts as a *seat* for the nylon check, a *safety disc* and a *gasket* between the valve body and the cylinder. Thus, possible leakage points are reduced to only 2 places—less than any other extinguisher of this type.

Extinguisher cylinders used with new valve are externally threaded . . . making easier assembly and disassembly . . . eliminating the possibility of cylinder neck stretching . . . strengthening the union between valve body and cylinder neck.

Here's fire extinguishing at its best.

New valve trigger has automatic safety. If disc ruptures, trigger pushes downward to show words "Replace Disc."

Kidde Fire Extinguishing "know how" brings you still better equipment—a new valve that works surer, quicker, easier.

When you think of CO_2, call Kidde.

Kidde

Walter Kidde & Company, Inc., 1254 Main St., Belleville 9, N. J.
In Canada: Walter Kidde & Company, Ltd., Montreal, P. Q.

"Front Man" of a Great Team

the Bucyrus-Erie TD-24 Bulldozer

BUCYRUS ERIE

With an International TD-24 under him and a Bucyrus-Erie Bulldozer up front, your operator commands a real dirt-moving power house. Whether he's digging slush pits, building access roads, backfilling or doing any of a dozen other oil field jobs, he'll punch out more yardage than you ever thought possible with one outfit.

Bucyrus-Erie Bulldozers were engineered, designed and tested with the TD-24. Weight distribution, blade design, and point of attachment all combine to take full advantage of the tractor's great power. The blade is curved to keep dirt moving freely — rolling it up and forward, smoothly and easily. What's more, the operator has complete visibility for the accurate control that means sustained high output.

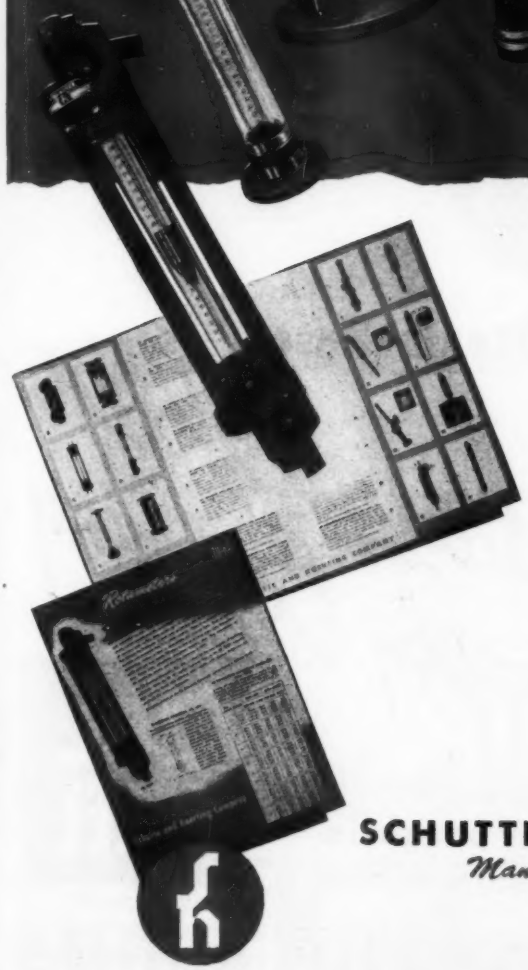
See your International Industrial Tractor distributor *now* and get the full story on how Bucyrus-Erie tractor equipment can help *you.*

198T50

BUCYRUS-ERIE COMPANY South Milwaukee Wisconsin

YOUR FLOW METERING PROBLEM

May Already be Solved...



...by one of the SK Rotameters in our standard line.

That's why it would pay you to investigate—acquaint yourself with the numerous types and sizes we have to offer.

Many years of experience in solving hundreds of customer problems have helped us to design a group of Rotameters sufficiently diversified to meet most industrial requirements. However, should your problem differ from others so radically that one of our standard types won't solve it, you can count on our engineers to give you all the help possible in designing a new unit which will.

Bulletin 18-RA, shown at left, pictures and briefly describes the construction and principle applications of all standard SK Rotameters. It's yours for the asking.

SCHUTTE and KOERTING Company

Manufacturing Engineers

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JET APPARATUS • HEAT TRANSFER EQUIPMENT • STRAINERS • CONDENSERS AND VACUUM PUMPS • OIL BURNING EQUIPMENT • ROTAMETERS • FLOW INDICATORS • RADIAFIN TUBES • VALVES • SPRAY NOZZLES AND ATOMIZERS • GEAR PUMPS • DESUPERHEATERS

Solve your Hose Problems with

REPUBLIC RUBBER
DIVISION
LEE RUBBER & TIRE CORPORATION

Mud Pump Hose

Rotary Hose

Unloading Hose

Steam Hose

In REPUBLIC oil country hose you get two important "PLUS" factors:

FIRST — The usual raw materials and manufacturing facilities PLUS Republic experience. In the case of Republic, experience has profited profoundly by continuous, intensive research. Republic oil country hose is like no other hose made, except for superficial appearance. You can expect better service — and you get it.

SECOND — If you decide to standardize on better hose, it doesn't take an Act of Congress to get Republic. We offer it through 105 sales points: 80 stores, 17 sales offices, 8 resident salesmen. We cordially invite you to ally yourself with this remarkable distribution system.

Member Petroleum Equipment Suppliers Association

80 Stores
17 Sales Offices
8 Resident Salesmen

"... here's MY warehouse!"

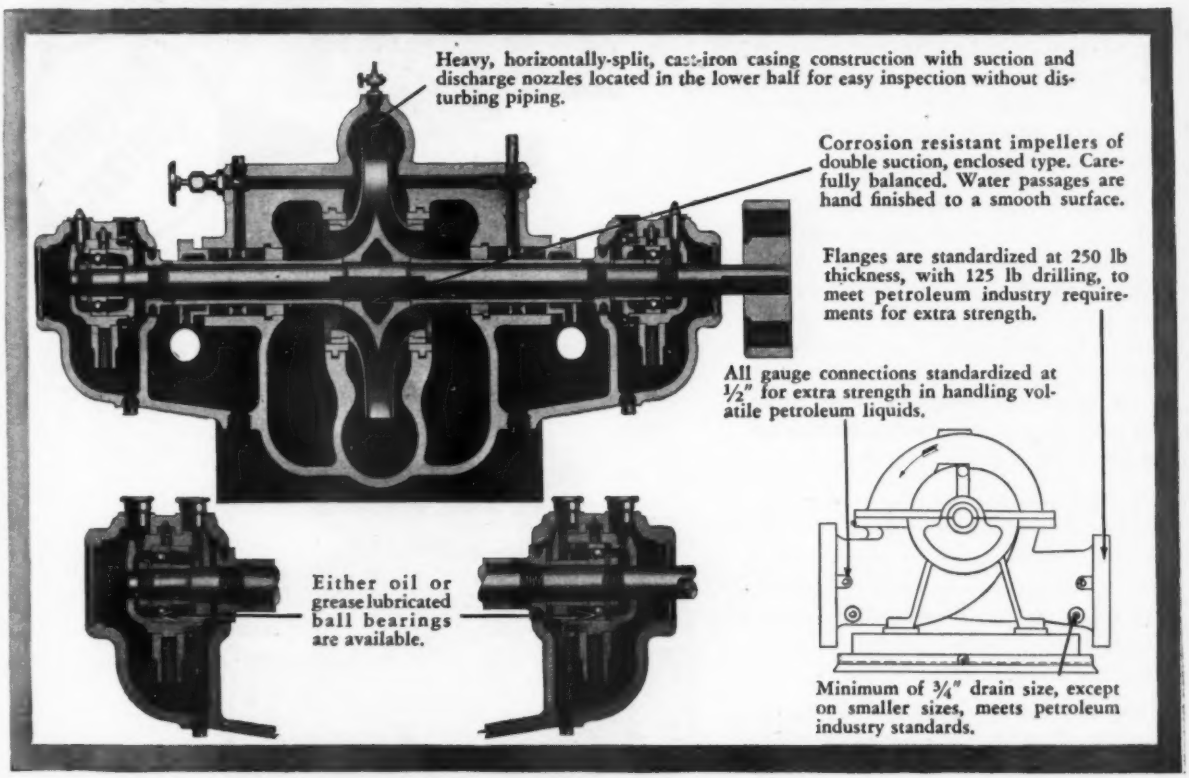
Jones & Laughlin Supply Company

Subsidiary of Jones & Laughlin Steel Corporation

J&L STEEL

TULSA, OKLAHOMA

Designed for Low Maintenance


Heavy, horizontally-split, cast-iron casing construction with suction and discharge nozzles located in the lower half for easy inspection without disturbing piping.
Corrosion resistant impellers of double suction, enclosed type. Carefully balanced. Water passages are hand finished to a smooth surface.
Flanges are standardized at 250 lb thickness, with 125 lb drilling, to meet petroleum industry requirements for extra strength.
All gauge connections standardized at ½" for extra strength in handling volatile petroleum liquids.
Either oil or grease lubricated ball bearings are available.
Minimum of ¾" drain size, except on smaller sizes, meets petroleum industry standards.

THE DEMAND FOR LOW MAINTENANCE pumps for the petroleum industry has steadily increased. To serve this specific need, Allis-Chalmers offers a *complete* line of Type S, single stage, double suction pumps, individually engineered to meet your specifications.

All parts are precision machined and carefully assembled. Heavy construction plus proper alignment of pump parts assure long life of wearing rings, sleeves, packing and bearings. Impeller and shaft are carefully balanced. Impeller clearances are accurately measured to cut recirculation losses.

Although the most common drives for centrifugal pumps are Allis-Chalmers squirrel cage induction motors, Allis-Chalmers also supplies a complete line of induction, synchronous and direct current motors, and gasoline engines of the generally used sizes for most pumping applications.

For complete information on Allis-Chalmers pumps and drives, contact your nearby A-C Sales Office, or write direct for Bulletin 08B6146A.

A-3157

ALLIS-CHALMERS, 1059A SO. 70 ST.
MILWAUKEE, WIS.

ALLIS-CHALMERS

A-C ALLIS-CHALMERS

Texrope is an Allis-Chalmers trademark.

Power, Electrical, Processing Equipment for Petroleum Industry

It's New!...but so much more than just New

TO CONTROL and maintain processes at ideal flow, temperature, or pressure, the new 150# Hancock Bronze Flocontrol Valve is the most efficient and economical valve you can use.

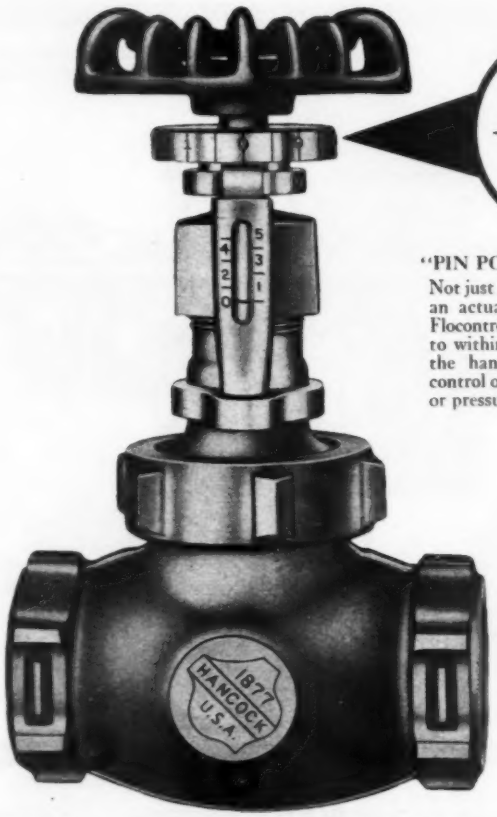
Though it is a fine, strong, leak-defying valve, *it is also a precision control instrument.* The Hancock Flocontrol has a sturdy micrometer dial and pointer securely attached to the valve bonnet. This device enables the operator to "set" the valve at the ideal opening—within a 1/100th turn of the handwheel. And this precise setting can be exactly and instantly duplicated the next day, week, or month.

The scientifically designed V-Port disc *compels proportional flow throughout the entire lift of the valve stem.* Straight-line flow is not dependent upon the short-wearing, fine threads of a needle valve. The Hancock Flocontrol Valve has long-wearing standard Acme threads.

The shut-off seating surface is entirely separate from the controlling V-Ports. Wire drawing and cutting action are minimized; a separate shut-off valve is not needed.

Seats and discs are "500 Brinell" stainless steel. Foreign matter or steam cutting cannot affect their mirror-like finish.

Hancock Flocontrol Valves reduce production costs. They eliminate guesswork in the control of flow, temperature, or pressure.



"PIN POINT CONTROL"
Not just a "catch phrase" but an actuality. The Hancock Flocontrol Valve can be "set" to within a 1/100th turn of the handwheel for precise control of flow, temperature, or pressure.

OTHER HANCOCK FLOCONTROL VALVES FOR HIGHER TEMPERATURES AND PRESSURES

BRONZE FLOCONTROL, 300# W.S.P., 550° F.
Globe & Angle—Screwed Ends—Sizes ½" thru 2"

STEEL FLOCONTROL, 600# W.S.P., 850° F.
Globe & Angle—Screwed & Socket Weld Ends
Outside Screw & Yoke—Sizes ¼" thru 2"

STEEL FLOCONTROL, 600# W.S.P., 800° F.
Globe & Angle—Flanged Ends
Outside Screw & Yoke—Sizes ½" thru 2"

CAST STEEL FLOCONTROL—Screwed Bonnet—300# W.S.P., 800° F.
Outside Screw & Yoke—Screwed & Flanged Ends—Sizes 2½" & 3"

CAST STEEL FLOCONTROL—Bolted Bonnet—300# and 600# W.S.P., 800° F.
Outside Screw & Yoke—Flanged Ends—Sizes 2½" thru 4"

Contact your nearest Hancock Distributor for complete information

MANNING MAXWELL & MOORE INC. M&M TRADE MARK

HANCOCK *Valves*

1877 HANCOCK U.S.A.

A PRODUCT OF

MANNING, MAXWELL & MOORE, INC.

WATERTOWN 72, MASSACHUSETTS

Makers of 'Hancock' Valves, 'Ashcroft' Gauges, 'Consolidated' Safety and Relief Valves, 'American' Industrial and 'Microsen' Electrical Instruments. Builders of 'Shaw-Box' Cranes, 'Budgit' and 'Load-Lifter' Hoists and other lifting specialties.

More and More

Cummins® Diesels

More Cummins Diesels are being delivered in new heavy-duty highway trucks using engines of 150 h.p. and over than any other make of engine—**gasoline or Diesel!**

And more 200 h.p. model NH-600 Cummins Diesels are being delivered in new heavy-duty highway trucks than any other engine—**gasoline or Diesel!**

CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA

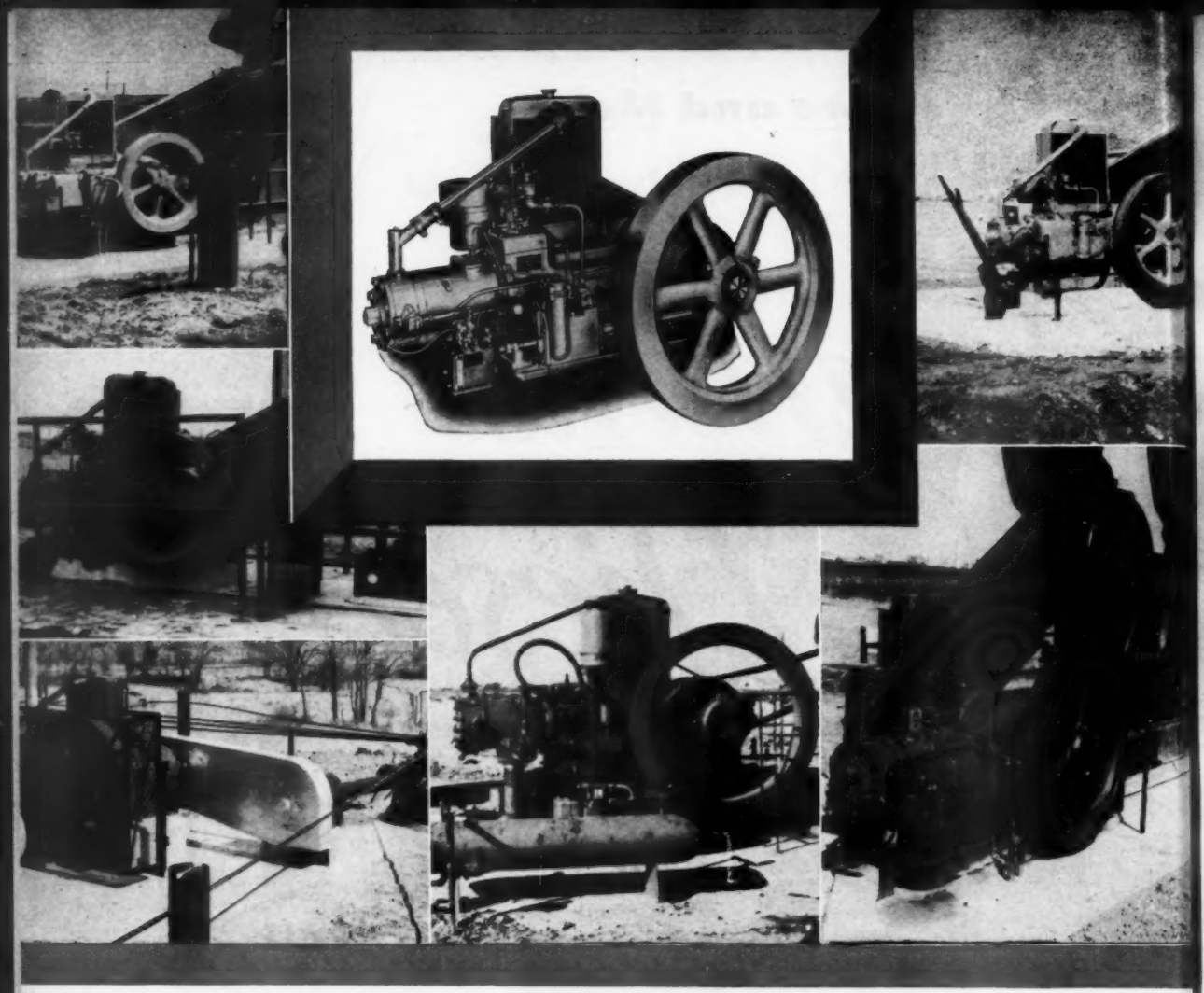
EXPORT: CUMMINS DIESEL EXPORT CORPORATION, COLUMBUS, INDIANA, U.S.A.—CABLE: CUMDIEX

CUMMINS Dependable DIESEL

TRADEMARK REG. U. S. PAT. OFF.

Diesel power by CUMMINS

Lightweight High-speed Diesel Engines (50-550 hp) for: On-highway trucks • off-highway trucks • buses • tractors earthmovers • shovels • cranes • industrial locomotives air compressors • logging yarders and loaders • drilling rigs • centrifugal pumps • generator sets and power units work boats and pleasure craft.



Ajax ON-THE-JOB Engines

RAIN OR SHINE—AROUND THE CALENDAR!

AJAX GAS AND OIL ENGINES thrive on hard work and small attention. The reasons for their continuously dependable operation are built-in for a long lifetime—and they serve just as faithfully in Montana winters as in Texas summers. • Choose and use AJAX for worry-free production. *Your Supply Man has the facts.*

AJAX ENGINES

AJAX IRON WORKS
CORRY, PENNSYLVANIA

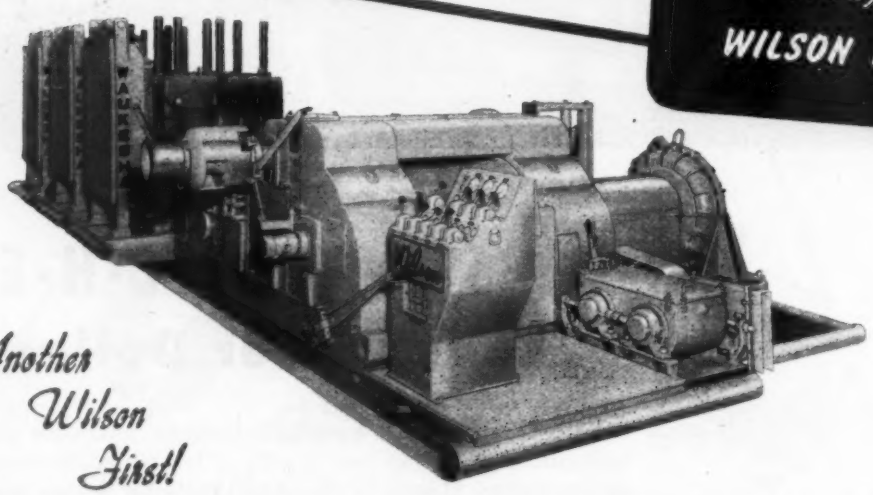
Oil Field Distributors: THE NATIONAL SUPPLY CO., TOLEDO, OHIO
R. B. MOORE SUPPLY CO., INC., BOLIVAR, N. Y. - BETHLEHEM SUPPLY CO., TULSA, OKLA.

LCP S-T-R-E-T-C-H-E-S
Your Power Dollar

LOW COST POWER handles the biggest jobs with trouble-free efficiency. If the job is only a fractional horsepower motor, Utility Electric LOW COST POWER is your best bet, too. . . . You get all the advantages of low operating, maintenance and labor costs . . . easy portability . . . fast starting in all weather . . . s-l-o-w depreciation. Save on initial cost of power-driven equipment. Save on repairs. *Everything's up* EXCEPT *Utility Electric Power.*

PETROLEUM ELECTRIC POWER ASSOCIATION

XUM



Another Wilson First!

The all new WILSON TORCAIR-ROADAIR RIG — the world's first rig to be designed for TORQUE CONVERTER DRIVE OR DIRECT ENGINE DRIVE. Completely new — from front to rear. It can be transported in one unit, or can be broken down into several smaller units. It contains Wilson Air-Tube Disc Clutches throughout, Full Pressure Water Cooled Brakes, and many other outstanding features, including the sensational Wilson Sectional Box Type Compound. The only rig with four Air Clutch Speeds on the Drum that can be changed while running — and under any load.

Wilson MANUFACTURING CO., Inc.
WICHITA FALLS, TEXAS

Choose from America's Greatest Truck Values!

CHEVROLET ADVANCE-DESIGN TRUCKS

You're right in every way when you choose Chevrolet trucks as your on-the-job partners. Chevrolet offers you more—in power for the job, economy of operation, low maintenance costs.

Economy-wise—you're right in choosing Chevrolet. You save money, for Chevrolet is the lowest priced line of all. And you save on gas, oil and upkeep with these trucks so famous for all-around economy.

Power-wise—you get more with Chevrolet, too. Chevrolet's great valve-in-head engine is the result of 38 years of steady improvement—an engine that offers outstanding pulling power combined with dependability and long service at low cost.

Job-wise—you're right with Chevrolet. There's a Chevrolet truck to fit *your* job . . . with the right power, the right clutch, the right power-train to fit the need. And every unit of the Chevrolet truck you select is *engineered* for the job. Yes, to *do* your job right—with outstanding efficiency and economy.

Before you buy, get all the facts on Chevrolet—first-cost, operating cost and maintenance cost. Remember: For the last eight consecutive truck production years, users have purchased more Chevrolet trucks than any other make. See your local Chevrolet dealer now!

CHEVROLET MOTOR DIVISION, *General Motors Corporation*, DETROIT 2, MICHIGAN

CHEVROLET

Only Chevrolet Trucks Give You All These Advance-Design Features:

• TWO GREAT VALVE-IN-HEAD ENGINES: the 105-h.p. Loadmaster or the improved 92-h.p. Thriftmaster—to give you greater power per gallon, lower cost per load • POWER-JET CARBURETOR—smoother, quicker acceleration response • DIAPHRAGM SPRING CLUTCH for easy-action engagement • SYNCHRO-MESH TRANSMISSIONS for fast, smooth shifting • HYPOID REAR AXLES—for dependability and long life • DOUBLE-ARTICULATED BRAKES—for complete driver control • WIDE-BASE WHEELS for increased tire mileage • BALL-TYPE STEERING for easier handling • UNIT-DESIGN BODIES—for greater load protection • ADVANCE-DESIGN STYLING for increased comfort and modern appearance.

XUM

THE OIL MAN'S *Headquarters* FOR

OFFICES AND STORES

ILLINOIS—Clay City, Grayville, Salem
KANSAS—Chase, Great Bend, McPherson, Pratt, Russell, Wichita
OKLAHOMA—Duncan, Oklahoma City, Pauls Valley, Ringwood, Sapulpa, Seminole, Tulsa
TEXAS—Borger, Dallas, Midland, Odessa, Pampa, Snyder

These men, like you, are constantly in need of fast, friendly service to fulfill their supply needs. The experience and ability of the staff at your nearest Bovaird Store are your constant guarantee of the service you desire. Further, you are assured of a most complete stock of nationally known brands of dependable equipment and supplies.

"Buy From Bovaird"

THE Bovaird SUPPLY CO.

GENERAL OFFICES
TULSA, OKLAHOMA

Sun Oil, Toledo, goes on stream with first big Houdriflow units...

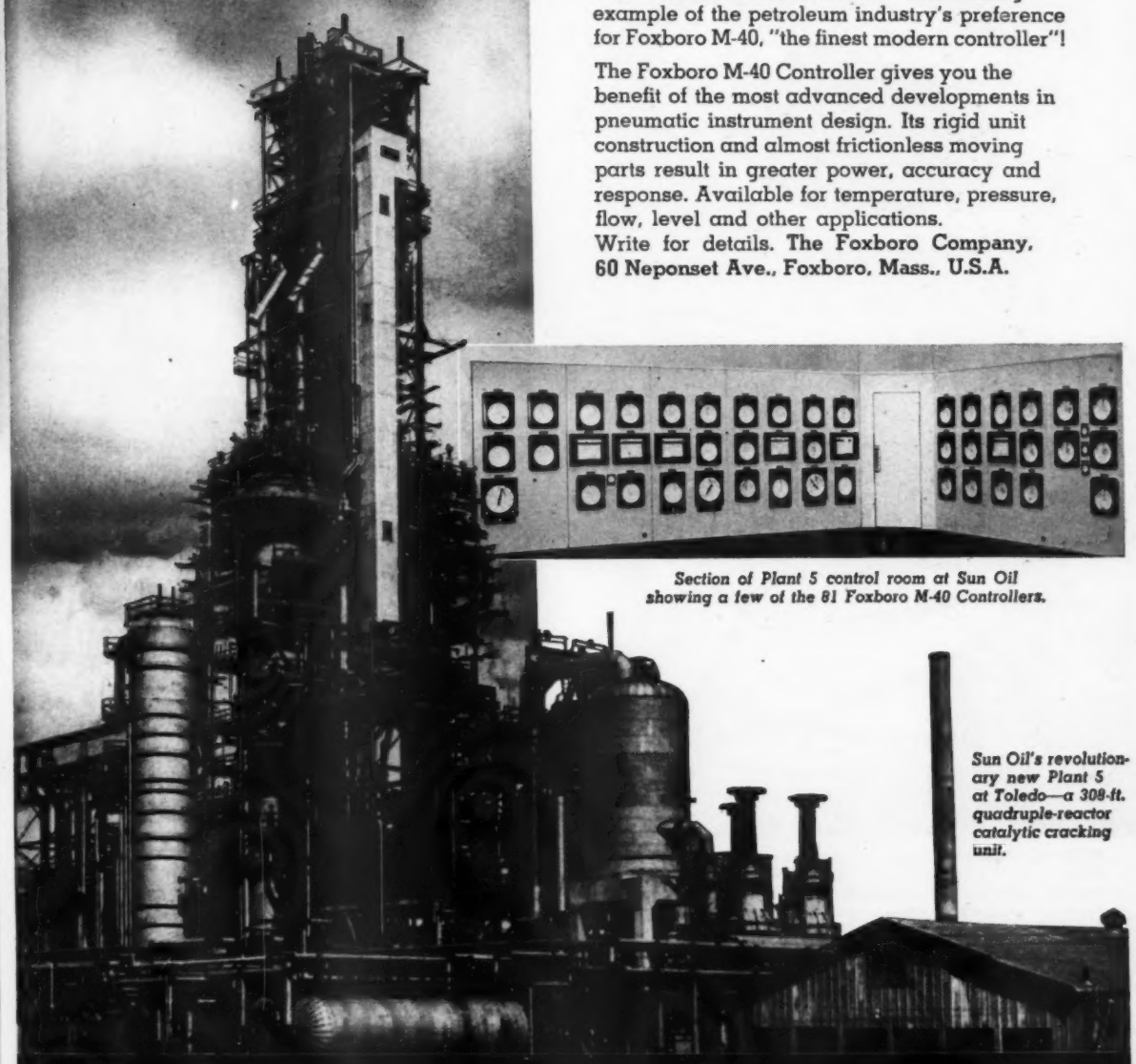
... under Foxboro M-40 Control

When Sun Oil Company's new Plant 5 at Toledo, Ohio, went on stream last May, 81 Model 40 Controllers took over critical control functions. Without any manual "juggling", process variables came directly to their control points, because M-40 met the preset values so exactly. And the inherent accuracy of the M-40 *held* them there, continuously!

This first major installation of Houdriflow "cat" crackers offers another outstanding example of the petroleum industry's preference for Foxboro M-40, "the finest modern controller"!

The Foxboro M-40 Controller gives you the benefit of the most advanced developments in pneumatic instrument design. Its rigid unit construction and almost frictionless moving parts result in greater power, accuracy and response. Available for temperature, pressure, flow, level and other applications.
Write for details. **The Foxboro Company, 60 Neponset Ave., Foxboro, Mass., U.S.A.**

Section of Plant 5 control room at Sun Oil showing a few of the 81 Foxboro M-40 Controllers.

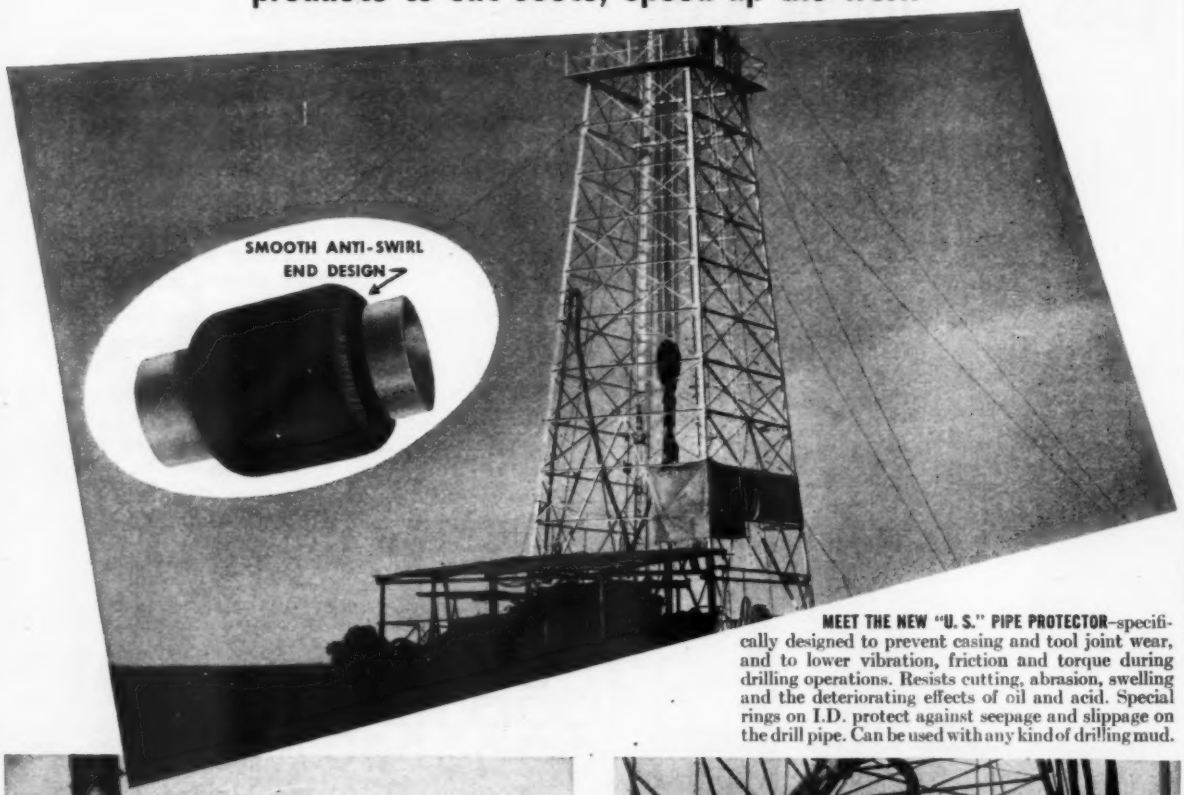


Sun Oil's revolutionary new Plant 5 at Toledo—a 309-ft. quadruple-reactor catalytic cracking unit.

FOXBORO REG. U. S. PAT. OFF. **CONTROLLERS**

SAVING MORE DRILLING DOLLARS

Operators throughout the oil fields depend on U. S. Rubber products to cut costs, speed up the work



MEET THE NEW "U. S." PIPE PROTECTOR–specifically designed to prevent casing and tool joint wear, and to lower vibration, friction and torque during drilling operations. Resists cutting, abrasion, swelling and the deteriorating effects of oil and acid. Special rings on I.D. protect against seepage and slippage on the drill pipe. Can be used with any kind of drilling mud.

ROUGH AND TOUGH mud pump suction work needs U. S. GIANT HEAVY DUTY BRAND. It is so flexible it can be quickly adjusted to the right position in the slush pit without changing connections. This hose keeps air out of the line, prevents mud ends from blowing, reduces wear on valves and damage to pistons. Steel wire reinforcement prevents collapse.

THIS U. S. ROTARY HOSE LASTS LONGER because it is the ideal hose for mousehole connections. Excessive straining and kinking at the ends avoided. The wire in the hose is applied with uniform tension in every ply, and the angle of the wire is controlled to meet diametric as well as longitudinal stress. Hose can handle the terrific pressures in today's deep-well drilling.

These are just a few of the many time-and-money saving products developed by U. S. Rubber engineers. Because these experts have long experience in specialized oil field service, plus the help of the vast "U.S." research facilities, they can provide you with invaluable help on your own particular oil problem. Write to:

PRODUCTS OF

U.S.RUBBER
SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

RELEASE TWO BOLTS *and* OPEN THE DOOR

TO CONVENIENT SCRAPER TRAP OPERATION—

UNIBOLT

SCRAPER TRAPS

Pipeliners, who for years have struggled with heavy, multi-bolt blind flange closures and leaky-thread bull plugs on scraper traps, are welcoming this easy-operating UNIBOLT Scraper Trap. You just release two bolts, and s-w-i-n-g the trap cover, or blanking plug, out of the way. A sturdy hinge carries the load. It's compact, it eliminates heavy lifting, and there's no danger of the closure falling on the workmen. Swing it shut, tighten two bolts, and the line is ready for business again!

Any line or unit that requires closures, such as the Gas Line Blowdown shown at left, or strainers, separators, scrubbers, mist removers and similar pressure vessels, may be UNIBOLT-equipped to real advantage. Wherever a blind flange is applicable, a UNIBOLT Coupling with Blanking Plug will do the job better . . . seal tighter, reduce weight, and save time.

UNIBOLT GAS LINE BLOWDOWN

Release two bolts and the hinged closure swings upward and open.

THORNHILL-CRAVER CO.

HOUSTON TEXAS

YOU CAN'T ARGUE WITH THE RECORDS

The Gaso business is built on records—the cold, hard cost records of users.

They tell a story of consistently lower pumping costs—per month, per year and per barrel.

What other reason would so many outstanding pipeline companies have for standardizing on Gaso Pumps?

SAY GASO . . . AND BE SURE . . .

GASO PUMP & BURNER MFG. CO. 902 EAST FIRST ST., TULSA, OKLA.

EXPORT OFFICE: 149 BROADWAY, NEW YORK

Shreveport: W. T. SOMNER CO., 419 Lake Street • Los Angeles: 2529 Chambers St., Vernon • Western Canada: Leffel Machine Co., Ltd., Edmonton, Alberta

GASO PUMPS

for every oil industry need

FOR sheer toughness there's no other protective coating like Pittsburgh's TANKHIDE!

● **The petroleum industry** has for many years recognized the advantage of using light colored tank paints to minimize the evaporation loss of volatile liquids. With its unusually high heat and light reflection characteristics, Pittsburgh's Synthetic White TANKHIDE prevents the excessive heat absorption that brings about waste by evaporation.

● **Not only** is evaporation loss held to a minimum, but the brilliant white appearance of TANKHIDE is maintained throughout its long life by its self-cleaning action.

● **TANKHIDE** is a combination of intensely white titanium pigments and weather-resistant vehicles which make it a durable, lasting metal protective coating. It is designed for one-coat hiding. TANKHIDE can also be brushed where spraying is not possible.

● **The quick set** and firm character of the film during the drying period not only prevent the collection of dirt and insects but also keep damage due to rain, scuffing and abrasion at a minimum.

● **TANKHIDE** is also available in synthetic gray and black as well as in gray and black oil-base coatings for various purposes. These can be used on wood and metal surfaces with equally good results.

● **Pittsburgh** also offers a wide variety of quality finishes for every need in the petroleum industry. These include IRONHIDE, specially designed for the decoration and preservation of iron and steel structures; METALEAF Aluminum Paints with high light and heat reflecting value; service and bulk station paints; pump enamels and drum finishes.

● **Call on us** for expert advisory service. Our wide experience in supplying finishes for the petroleum industry can be helpful and save you time and money.

• • •

PITTSBURGH PLATE GLASS COMPANY
Industrial Paint Division, Pittsburgh, Pa.
Factories: Milwaukee, Wis.; Newark, N. J.; Springdale, Pa.; Houston, Texas; Los Angeles, Calif.; Portland, Ore. Ditzler Color Division, Detroit, Mich. The Thresher Paint & Varnish Co., Dayton, Ohio. Forbes Finishes Division, Cleveland, Ohio. M. B. Suydam Division, Pittsburgh, Pa.

PITTSBURGH *Industrial* FINISHES
PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS
PITTSBURGH PLATE GLASS COMPANY

XUM

Running nuts with a CP-365-RP Impact Wrench.

speed maintenance

WITH CP TOOLS AND EQUIPMENT

CP-403 Triple Scaler removes rust and scale rapidly without damaging metal surface below.

In the wide range of CP Equipment you'll find exactly the right tool for every refinery maintenance job.

There are CP air-powered impact wrenches for all kinds of nut-running; heavy-duty grinders; tube rollers; scalers and wire-brush machines to remove rust, scale and paint; and scores of other time-saving tools.

CP Air Compressors, stationary and portable, are notable for dependability, low maintenance, economical operation.

Self-rotating, 7½ pound, air-powered CP-9 Handril permits one-hand operation on overhead work.

CP-210 Portable Compressor with Caterpillar Diesel engine. There's a wide range of sizes both in gasoline-driven and Diesel-driven models.

CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

Rugged-duty drill rig rigged with 20 TIMKEN® bearings

THIS Franks KC-45-H Drill *has* to be rugged. It's used in the field where hard drilling is encountered.

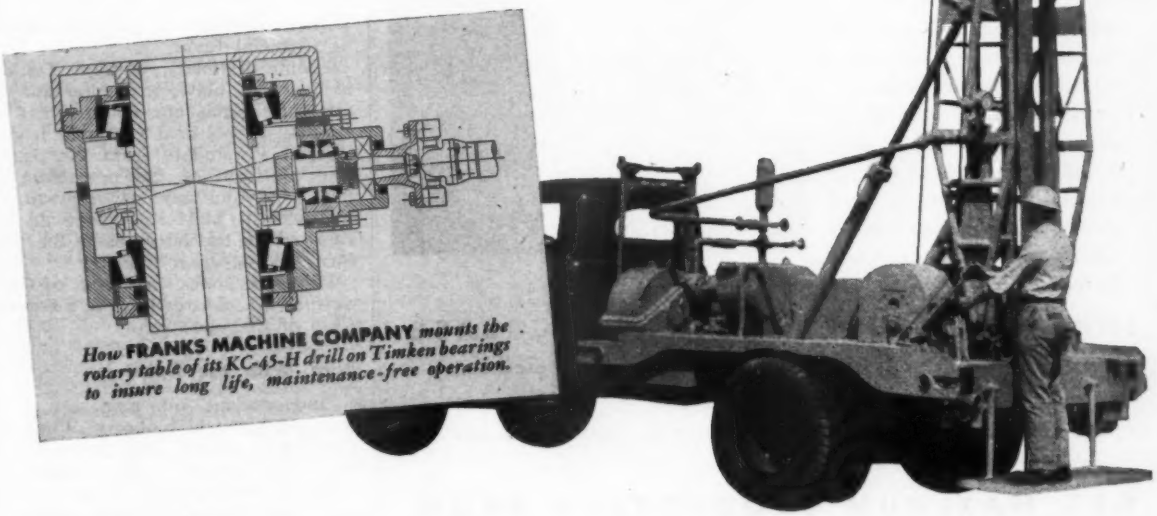
Built by the Franks Machine Company for heavy-duty oil, water, or core drilling, it's mounted on a total of 20 Timken® tapered roller bearings—in the draw works drive, rotary table, pulldown speed reducer, slush pump crank shaft and truck wheels. With these critical parts on Timken bearings, operators can be certain the Franks drill will stay on the job and give long, trouble-free service, even when the going gets tough.

Timken bearings hold gears and shafts in proper alignment, assuring a smooth, even flow of power. Excessive wear on moving parts is eliminated. Because of their smooth surface finish and true rolling motion, Timken bearings virtually eliminate friction. Line contact between the rollers and races gives extra load-carrying capacity. And tapered construction enables Timken bearings to take any combination of radial and thrust loads.

Lubrication and maintenance time are reduced because Timken bearings permit tight closures that keep damaging dirt and moisture out, lubricant in. And Timken bearings normally last the life of the machine because they are (1) engineered for the job, (2) made of Timken fine alloy steel, and (3) precision manufactured.

It will pay you to make sure Timken bearings are used in the equipment you buy or build. Look for the trademark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

This symbol on a product means its bearings are the best.



How **FRANKS MACHINE COMPANY** *mounts the rotary table of its KC-45-H drill on Timken bearings to insure long life, maintenance-free operation.*

POSITIVE ROLLER ALIGNMENT

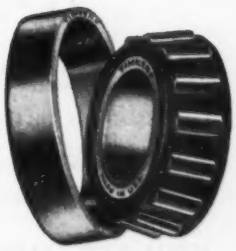
Wide area contact between roll ends and rib of the cone prevents Timken rollers from skewing. Result: bearings roll easier, last longer.

The Timken Company is the acknowledged leader in: 1. advanced design; 2. precision manufacture; 3. rigid quality control; 4. special analysis steels.

TIMKEN

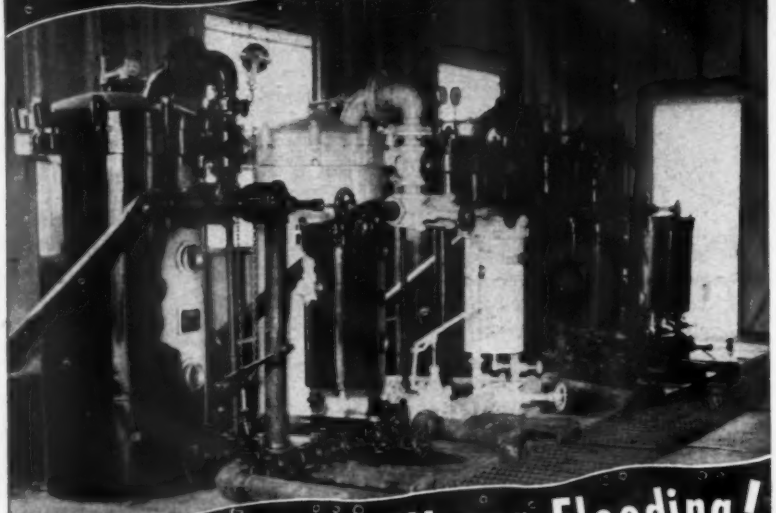
TRADE-MARK REG. U. S. PAT. OFF.

TAPERED ROLLER BEARINGS

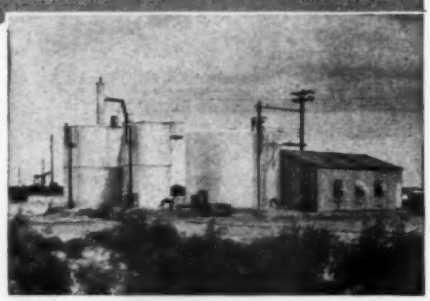


NOT JUST A BALL ◯ NOT JUST A ROLLER ⬭ THE TIMKEN TAPERED ROLLER ⬭ BEARING TAKES RADIAL ◫ AND THRUST ⟷ LOADS OR ANY COMBINATION

KEEP OIL SANDS OPEN



. . . with Clean Water Flooding!



These photographs show the water treating plant of a prominent Texas producer.* In an 8-month period, according to their report, 1,600,000 barrels of Bowser filtered water were pumped down 2700 feet into tight sand, recovering 210,000 barrels of oil.

INPUT PRESSURES DID NOT INCREASE

. . . because Bowser Diatomite filtration removed suspended solids from the water, including bacteria and oil. Jamming of the oil sand was effectively prevented, although permeability was very low.

GET MAXIMUM PRODUCTION FROM SECONDARY RECOVERY

Bowser Diatomite filtration systems have proved their ability to keep water flowing freely through oil sand—the most important factor in secondary recovery operations.

If acid treatment or other methods are reducing the production life of your wells, write us today.

**Name on request*

BOWSER, INC., 1328 Creighton Ave., Fort Wayne 2, Ind.

LIQUID CONTROL SPECIALISTS SINCE 1885

They Say—

Some Platform

"Suppose 50 years ago the people had written a platform for this fledgling industry, with the objective of bringing about the greatest good for the greatest number. It would have included:

"The discovery of more and more crude oil.

"The production, refinement, and distribution of more and more oil products.

"The establishment of laboratories to develop 2,600 practical products from a drop of oil.

"A policy of enlightened selfishness, not only to make the products better and better, but at a lower and lower price, which would make them available to all, rich and poor alike.

"A full supply in peacetime, and an emergency supply in time of national peril.

"A development not dependent upon public subsidy, but risks taken and rewards—when, as, and if any—by and to individual citizens.

"A system whereby its leaders would come from the bottom up, without benefit of political, family, or financial favor.

"Some platform, you say? Yes, and as political platforms come and go, one that stands out as the great exception. A political platform is considered a mandate from the people. The platform of the petroleum industry is voluntary, self-imposed, yet no political platform was ever carried out to the letter as is the platform of this great industry."

W. Alton Jones, president of Cities Service Co., addressing the Executive Club of Chicago.

Born With the Spirit

"Independent oil men are born with the spirit of pioneers. Wherever they have settled, they have helped build and improve the community, whether it is a small village, a city, or a state. Almost without exception, every oil man I know has played a part in the civic life of the city in which he lives. There are few churches, hospitals, or other charitable institutions in San Antonio, Houston, Dallas, Fort Worth, or any other city in Texas which have not had generous contributions given them by independent oil men.

"I say this, not to brag on the independent oil men, but to bring out the fact that sometimes the public is inclined to judge all independent oil men by some thoughtless act of one individual. Independent oil men are, I believe, good, sound citizens who contribute generously to every

worthwhile endeavor for the benefit of their community and country."

H. Roy Cullen, Houston, speaking to The Texas Independent Producers and Royalty Owners Association in San Antonio October 18.

Push for the Car

"The amount of energy in a gallon of gasoline is so large that if it could be converted altogether into push for the car, without any loss of efficiency whatsoever—which, of course, is not at all possible—it would drive a 3,000-lb. car at 30 miles per hour a distance of 200 miles.

"The fact that only a small fraction of that long mileage is being obtained in practice shows how far cars are from perfection in the matter of efficiency. But it shows also this important thing—that efforts to boost miles per gallon, to which so much attention has been and is being devoted, rest on a solid foundation."

T. A. Boyd, consultant of General Motors Research Laboratories, speaking to sections of the American Chemical Society in Bartlesville, Okla.

Pangs of Growth

"Just contemplate with me a moment the problems faced in building the industry as rapidly as was required. Exploration for new crude supplies had to be stepped up feverishly. Drilling activity had to reach new highs in terms of numbers of wells and many of these wells had to be drilled to greater depths. Greatly expanded refinery capacity had to be provided.

"New pipe lines had to be constructed to move the raw product to the refinery and the finished product to the market. New markets had been created by shifts of population that required new distribution facilities. New financial resources had to be brought into the picture to supplement plowed-back earnings. The public demanded more petroleum, and more it should have.

"And to the extent physically possible, it would have these additional quantities at prices that did not appreciate as much as prices generally increased. Competition saw to that. Each member of the industry knew that to stand still was to fall back. The race would go to the strong."

John W. Boatwright, general manager of distribution economics department, Standard Oil Co. (Ind.), speaking to the Rotary Club at Joliet, Ill.

CALENDAR

December

Natural Gasoline Association of America, Herring Hotel, Amarillo, December 8.

Interstate Oil Compact Commission, winter meeting, Shamrock Hotel, Houston, December 11-13.

puttin's a breeze . . .
his mind's at ease

Yes sir, here's a chap that can really concentrate on a putt! He knows that a flash fire can't stop production at his plant . . . equipment, materials, buildings, and the lives of employees are fully protected with modern, approved C-O-TWO Fire Protection Equipment.

You, too, can have this same ease of mind about your factory, mill, warehouse, power station or research center. There are fire hazardous areas that particularly need C-O-TWO fast, positive fire protection: spray booths, dip tanks, solvent baths, electrical equipment enclosures, mixing vats, storage tanks, pump rooms, record vaults, store rooms, especially anywhere there's danger of flammable liquid or electrical fires. At many locations a C-O-TWO Combination Smoke Detecting and Fire Extinguishing System is a "must". The first trace of smoke in a protected area sounds an alarm . . . then fast, clean, non-damaging, non-conducting carbon dioxide blankets the fire, putting it out in seconds, before it spreads and causes extensive damage . . . no lingering odors, no water damage with carbon dioxide.

So, whatever your fire protection problem, let an expert C-O-TWO Fire Protection Engineer help you in planning complete and up-to-date fire protection facilities now. Write us today . . . tell us about your particular fire hazards, our experience is at your disposal . . . there is no obligation of course.

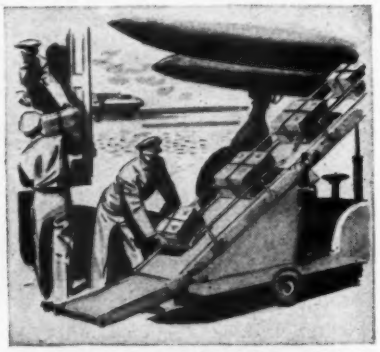
C-O-TWO

C-O-TWO FIRE EQUIPMENT COMPANY
NEWARK 1 • NEW JERSEY
Sales and Service in the Principal Cities of United States and Canada
Affiliated with Pyrene Manufacturing Company
MANUFACTURERS OF APPROVED FIRE PROTECTION EQUIPMENT
Squeez-Grip Carbon Dioxide Type Fire Extinguishers • Dry Chemical Type Fire Extinguishers
Built-In High Pressure and Low Pressure Carbon Dioxide Type Fire Extinguishing Systems
Built-In Smoke and Heat Fire Detecting Systems

Completes 300 TV sets— meets daily quota (at a cost of $4.70)

Delicate coils were needed by Midwest manufacturer to complete 300 TV sets . . . and Massachusetts supplier was 920 miles distant! Air Express assured delivery by 8 o'clock next morning, so manufacturer ordered 500 men to report for work. Shipment arrived 7:20 A.M.—production rolled! Shipping cost for 17-lb. carton only $4.70! Manufacturer uses Air Express regularly to keep business in high gear.

$4.70—and special pick-up and delivery included! Low Air Express rates cover door-to-door service. More convenient—easy to use. Just phone for pick-up! (Many low commodity rates in effect. Investigate.)



Air Express goes on all flights of Scheduled Airlines. Shipments keep moving around the clock—speeds up to 5 miles a minute. *Experienced* handling. Phone Air Express Division, Railway Express Agency, for *fast action*.

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World's fastest transportation method.
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January

American Gas Association, home-service workshop, Hotel Statler, Washington, D. C., January 3-5.

Kansas Oil Men's Association, annual convention, Lassen Hotel, Wichita, January 8-9.

Society of Automotive Engineers, annual meeting and engineering display, Hotel Book-Cadillac, Detroit, January 8-12.

American Institute of Electrical Engineers, Tulsa Section, meeting on explosion-proof motors, Michaelis Cafeteria, January 11.

Southwestern Legal Foundation, second annual institute on oil and gas law and taxation, Southwestern Legal Center, Dallas, January 18-20.

Compressed Gas Association, annual meeting, Waldorf-Astoria Hotel, New York City, January 22-23.

Northwest Petroleum Association, annual convention, Nicollet Hotel, Minneapolis, January 25-26.

Southern Gas Association, employe-relations section and accident-prevention round tables, Mobile, Ala., January 26.

Instrument Society of America, New York section, Hotel New Yorker, New York City, January 26-27.

February

American Institute of Electrical Engineers, Tulsa Section, meeting on explosion-proof electrical equipment, Michaelis Cafeteria, February 8.

American Institute of Mining and Metallurgical Engineers, annual meeting, Jefferson and Statler hotels, St. Louis, February 19-22.

Kentucky Petroleum Marketers Association, annual meeting and trade show, Brown Hotel, Louisville, February 20-21.

Iowa Independent Oil Jobbers' Association, Inc., annual convention, Hotel Fort Des Moines, Des Moines, February 21-22.

Wisconsin Petroleum Association, annual convention and equipment show, Milwaukee Auditorium, Milwaukee, February 27-28.

March

American Society for Testing Materials, spring meeting and committee week, Cincinnati, March 5-9.

American Petroleum Institute, division of production, southwestern district meeting, Hotel Beaumont, Beaumont, Tex., March 7-9.

Indiana Independent Petroleum Association, spring convention and refiners and suppliers exhibit, Hotel Severin, Indianapolis, March 8-9.

Mid-West Gas Association, Hotel Fontenelle, Omaha, March 12-14.

Illinois Petroleum Marketers Association, annual convention, Sherman Hotel, Chicago, March 13-15.

National Association of Corrosion Engineers, annual conference and exhibition, Statler Hotel, New York City, March 13-17.

Gas Appliance Manufacturers Association, annual meeting, The Homestead, Hot Springs, Va., March 19-21.

Ohio Petroleum Marketers Association, annual convention and marketing exposition, Deshler-Wallick Hotel, Columbus, Ohio, March 20-22.

American Petroleum Institute, division of production, Mid-Continent district spring meeting, Herring Hotel, Amarillo, March 21-23.

Texas Independent Producers and Royalty Owners Association, fifth annual meeting, Beaumont, Tex., March 27-28.

New England Gas Association, annual meeting, Hotel Statler, Boston, March 29-30.

April

American Gas Association, industrial and commercial gas section, conference on industrial and commercial gas, Shoreham Hotel, Washington, D. C., April 2-4.

American Society of Mechanical Engineers, spring meeting, Atlanta, April 2-5.

Instrument Society of America, New Jersey section, Essex House, Newark, N. J., April 3.

American Petroleum Institute, division of

production, Eastern district meeting, Desh-ler-Wallick Hotel, Columbus, Ohio, April 3-5.

Mid-West Regional Gas Sales Conference, Edgewater Beach Hotel, Chicago, April 9-11.

Southwestern Gas Measurement Short Course, University of Oklahoma, Norman, April 10-12.

American Gas Association, distribution, motor vehicle, and corrosion conference, Hotel Peabody, Memphis, April 16-18.

American Society of Lubrication Engineers, annual convention and lubrication show, Bellevue-Stratford Hotel, Philadelphia, April 16-18.

National Petroleum Association, Hotel Cleveland, Cleveland, April 18-20.

American Petroleum Institute, Rocky Mountain district spring meeting, Gladstone Hotel, Casper, Wyo., April 19-20.

Southern Gas Association, Buena Vista and Edgewater Gulf hotels, Biloxi, Miss., April 23-25.

Natural Gasoline Association of America, annual convention, Mayo Hotel, Tulsa, April 25-27.

Indiana Gas Association, French Lick Springs Hotel, French Lick, Ind., April 26-27.

American Gas Association, industrial and commercial gas section, industrial gas school, William Penn Hotel, Pittsburgh, April 29-May 4.

American Geophysical Union, thirty-second annual meeting, National Academy of Sciences, Washington, D. C., April 30-May 2.

American Petroleum Institute, division of refining, sixteenth mid-year meeting, Mayo Hotel, Tulsa, April 30-May 3.

May

Liquefied Petroleum Gas Association, annual convention and trade show, Stevens Hotel, Chicago, May 6-9.

Gas Appliance Manufacturers Association, natural-gas department spring meeting, Dallas, May 7-9.

American Petroleum Institute, division of production, Pacific Coast district, spring meeting, Biltmore Hotel, Los Angeles, May 10-11.

American Institute of Chemical Engineers, regional meeting, Hotel Muehlebach, Kansas City, May 13-16.

American Gas Association, operating section, production and chemical conference, Hotel New Yorker, New York City, May 14-16.

Pennsylvania Gas Association, Wernersville, Pa., May 15-17.

American Petroleum Institute, division of marketing, mid-year meeting, Cincinnati, May 28-29.

Third World Petroleum Congress, Kurhaus, Scheveningen, the Netherlands, May 28-June 6.

American Petroleum Institute, standardization and standing committees, division of production, mid-year meeting, Brown Palace Hotel, Denver, May 28-June 1.

June

American Society of Mechanical Engineers, semiannual meeting, Toronto, Ont., Canada, June 11-15.

Canadian Gas Association, Bigwin Inn, Lake of Bays, Ont., Canada, June 16-20.

American Society for Testing Materials, annual meeting, Atlantic City, N. J., June 18-22.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas-Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

Houston Nomads, second Monday of each month, Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month, Jonathan Club.

New York Nomads, annual Christmas dance, December 9, Hotel Pierre.

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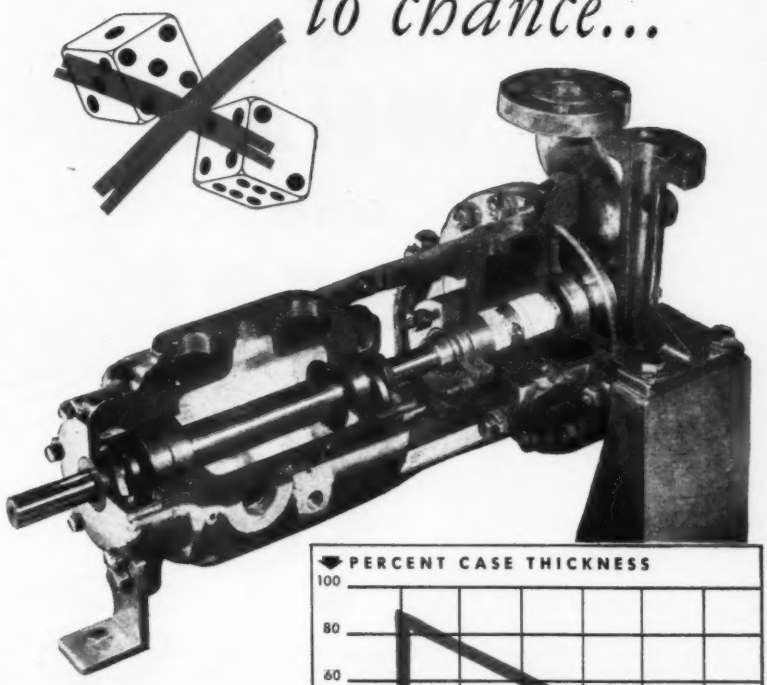

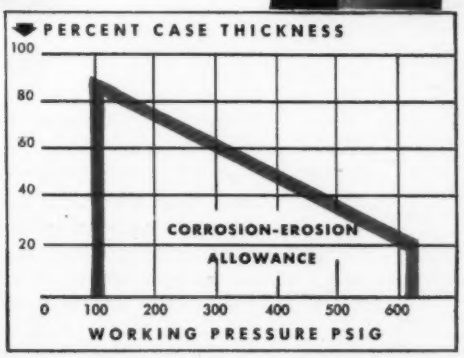

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XUM

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JOURNALLY Speaking

Those Specials

THE originator and custodian of this page is away on a delayed and we hope an enjoyable vacation. No doubt he will return full of whatever it is that results in the author getting more fan mail than any other member of the staff. Incidentally, since he started publicizing the Desk and Derrick Club, this correspondence, we understand, has been running heavy on the feminine side. We have been assured that this latest development has nothing to do with his vacation plans. Perhaps this is the point to mention that he is married and the father of three children.

The rest of us can't hope to duplicate the style and variety of subjects which have been outstanding on this page from its beginning. When two or more oil writers agree on how anything should be written the millenium or the opposite will have been reached.

Today we shall attempt a brief answer to the frequent query as to "how do you get out one of those special issues." We had 10 of these issues this year and there will be 11 next year. We shall have more to say about the extra one for next year at a later date.

Briefly these "specials" take a lot of doing on the part of every department of our favorite oil publication.

The doing starts months in advance, when the editors go about gathering the material. The cooperation of outside experts on specific subjects is arranged for, staff assignments are made, illustrations are assembled, and a tentative listing of subjects is made. In due course the articles are edited for technical accuracy and style, "art" selected, charts and diagrams finished up, and the complete manuscript handed to an editor whose job it is to take over from that point.

Copy is fed to the linotype machines whose five veteran operators have seen a total of 100 years with the Journal. As lulls occur in setting material for current issues, this pile of copy is attacked, and galley proofs begin to pour forth. Layouts are made, engravings ordered, and dummy pages pasted up for the guidance of the compositors, another group of veterans, many of whom proudly wear their 20-year pins.

As pages are made up, they are placed in a cubbyhole marked Special Issue, to await receipt of the layout from the production department, indicating the number of pages in the issue, and which are to be the editorial pages. Beginning 3 weeks before publication date, these pages are assembled, examined, and scheduled. They are made up on the compositors' stones into 32-page forms and sent to the press room, the presses of which never cease their diligent rumbling on the floor directly beneath the editorial sanctum. Working day and night, these presses grind out their forms, which are then folded and bundled to await binding.

When all the forms are printed, including the late news form which goes to press at noon on Tuesday of each week of publication, they are placed in the mechanical marvel, the binding machine, which gathers them up, staples them together, and pastes covers on them. The guillotine then trims off the edges and the completed magazines are placed on the mailing desk for stuffing into envelopes, addressing, and transporting to the general post office, directly behind the Journal building. The mailing crew begins its labors in the wee sma' hours, and finishes up around noon on Wednesday.

You may be interested in the number of forms printed in one of the Big Yellow Book specials. We were, so we asked the production department. The A.P.I. issue, printed last month, required 51 press runs. Many of these, of course, were for color printing, and not all of them were 32-page forms, but it takes just as long to run a 16-page form through the presses as a 32-page.

Already in progress is work on the Journal's International Number, the 1951 Review and Forecast Number, the Golden Anniversary Number, and the Refining Number.

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December 7, 1950

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XUM

No wonder it is called "the most VERSATILE* tool in the oil business"

**Webster's Dictionary defines as; "Turning with ease from one thing to another; having an aptitude for new tasks."*

Although we know of literally dozens of different types of jobs that have been performed with the Baker Model "K" Cement Retainer and Casing Bridge Plug (Product No. 400) there are probably an equal, or greater number of "new tasks" which have not come to our knowledge.

It is easy to generalize and list the uses of this truly remarkable device for placing and squeezing cement; placing and squeezing plastics; acidizing; testing; as a bridge plug; and as a fishing tool. But think of the endless variations of these applications, and you will understand why a Baker sales and service engineer had the following to say in an address made to his fellow field workers:

"Certainly I'm enthusiastic about the Baker Cement Retainer—in fact I am *excited* about it! Has any other tool in the oil business successfully solved so many problems? Has any other tool accomplished more? I think not.

"I have seen liners screwed on the bottom of this Retainer, run in the well and cemented. I have seen it set in liners, and the liner run in the well and cemented. I have seen it set between perforations, and cement circulated behind the casing; and I have seen it set in parted strings of casing, the casing picked up, and cemented back in place.

"It has been routine to place plastic in a well with the Baker Model "K" Cement Retainer for the purpose of reducing high gas/oil ratios. Its use has been routine for the purpose of consolidating sands, and plastic has been pumped through it for repairing breaks in casing. But there are many other variations. Not only has a one-zone acid job been done with this tool, it has been used for acidizing two zones. Not only have these zones been acidized, but the well has been brought in through the tool, and a test made. Not only has a test been made through the tool after acidizing, it has been left in the well and used as a production packer! I have helped in its being set above perforations, the well brought in by swabbing or circulating water, a test made; and when the water/oil, or gas/oil ratio was too high, a squeeze job performed through the retainer.

"Has its use been confined to the setting in casing? Not at all; it has been successfully used in open hole.

"In addition to these few applications mentioned, the Baker Model "K" Cement Retainer can be used as a bridge plug! Has any other tool in the oil business successfully solved so many problems? Is any other tool so versatile? I think not. What is its future? What will be the future problems encountered in drilling and producing oil wells; what will be the future problems of secondary recovery; what will be the future problems in remedial work? What new media will be used for cementing, plugging, consolidating and acidizing? I am certain that the solutions to these problems will involve the use of the Baker Model "K" Cement Retainer and Casing Bridge Plug, and improvements and adaptations of it."

ABOVE
Construction details of "Cement Retainer" equipped with Junk Pusher.

LEFT
Baker Cement Retainer, with Circulation Joint and Control Unit, to provide "versatility".

RIGHT
Baker Retainer "Bridge Plug" with Wire Line Pressure Setting Assembly.

The Baker Junk Pusher has slots which permit passage of displaced fluid, but prevent passage of junk or debris which might foul the slips.

NOW RUN AND SET ON AN ELECTRICAL CONDUCTOR CABLE

Since the above address was delivered, and as if to justify this man's predictions of the future, we have developed a method for setting this efficient device as a Casing Bridge Plug when run on an electrical conductor cable. This application is available through several leading service organizations having trucks equipped with all necessary accessory equipment to set the Baker Model "K" Retainer Bridge Plug, Product No. 400-D, accurately at the desired depth, to provide a positive, leak-proof bridge plug which prevents movement of fluid or gas either up or down the well. The "Cast Iron" type Bridge Plug is recommended for permanent installations; the "Magnesium Alloy" type for use as a temporary bridge plug. The former type is designed with easy drillability in mind (even to segmented slips which break up readily); while the "Magnesium" Bridge Plug represents the ultimate in easy drillability.

Complete descriptions, illustrations and specifications are in the Composite Catalog, as well as the separate Baker Catalog gladly sent to any oil man upon request. Inquiries to any Baker Office or representative will receive prompt and courteous attention.

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Finding Reserves

Comments within and outside the oil industry and reports appearing in the press often reflect confusion as to the basic facts pertaining to this country's and the world's petroleum reserves. Partially this stems from the fact that the term "reserves" is not understood. Here are a couple of definitions:

Proven reserves—the figures generally used in evaluating underground inventories—are estimates of the number of barrels of liquid hydrocarbons that can be recovered from blocked-out reservoirs by presently applied methods under current price conditions.

Potential reserves are estimates of the number of barrels of liquid hydrocarbons that can be economically produced from blocked-out reservoirs by the application of methods not currently employed and in reservoirs not yet discovered or fully evaluated by drilling.

The job of the exploration and production departments is to turn these potential reserves into proven reserves at a rate that will keep abreast of the constantly growing demand for petroleum products. How quickly and how easily this can be done will vary widely by areas.

We have no quarrel with those who speak in terms of 100 to 150-billion-barrel reserves for the Middle East, provided they make clear that these are potential figures with current proven reserves about one-third the maximum projection.

In this country a substantially different condition exists. This nation's proven reserves have been developed from thousands of reservoirs in contrast to the situation in the Middle East where the reserves come from a few accumulations of large area and thickness.

Since the war's restrictions were lifted domestic operators have been able to find new proven reserves in excess of production. But this has only been possible through the most active exploration activity in history.

Last year over 7,000 wildcat tests were drilled in this country, more than a 100 per cent increase over the active prewar year of 1940. This year's wildcatting is running 16 per cent ahead of 1949. Middle East proven reserves to date have been found with approximately 100 wildcats.

It has been estimated that there remains a minimum of 50 billion barrels of potential oil in the United States. In the face of constantly mounting domestic demands and the requirements of an immediate and long-range defense program, it is imperative that the operators be given every encouragement to convert this potential into actual oil.

The additional possibilities of mammoth reserves in other parts of the world should not be permitted to minimize requirements of this country, which conceivably, in an emergency, would have to be supplied entirely from within its own boundaries.

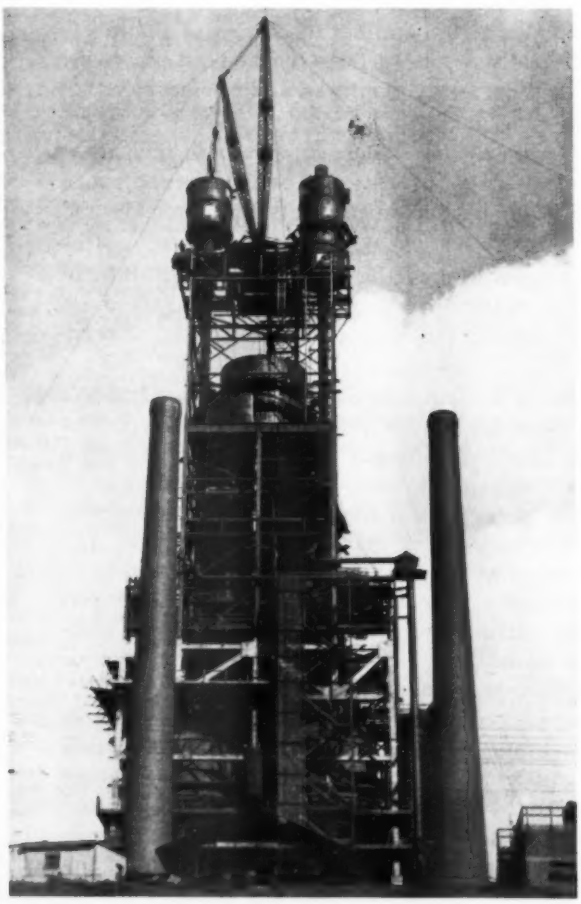
XUM

THIS WEEK

IMPORTS—State Department expected to announce method by which oil-import quota provisions of Venezuelan trade agreement will be administered. . . . Indications are that it will provide for country allocations based on average imports between 1946-49 inclusive. . . . ¶Recent developments indicate possibility that imports of foreign oil might be increased beyond 1,000,000 bbl. daily estimated for first 6 months of 1951, I.P.A.A. counsel says. . . .

STEEL—I.P.A.A. seeks details on Commerce Department's policy on export of critical materials for foreign-oil development. . . . Spokesman for group says present steel shortage is the most critical problem facing oil industry today. . . . ¶Exports of steel pipe for foreign projects criticized. . . .

EXPORTS—Senator calls for thorough investigation of export-control program, creation of watch-dog committee to guard against shipments of strategic materials to Communists. . . . ¶ECA, NPA expected to have control of exports for foreign-oil development, with PAD participating in discussions but not in decisions. . . .



OHIO'S TALLEST.—The tallest industrial structure in the Buckeye state is this new $4,000,000 catalytic cracking unit now rising above Cleveland's industrial skyline at the No. 1 refinery of Standard Oil Co. (Ohio). Now about 80 per cent completed, steel workers, welders, electricians, and other workmen are working two shifts daily on its construction. It will have charge capacity of about 20,000 bbl. daily. Previously, the new cat cracker at Sohio's Lima refinery was the state's tallest industrial structure.

WASHINGTON—Concern expressed over apparent lack of planning against possible loss of any foreign sources of oil supply in view of serious Far East situation. . . . ¶NPC legal group asks council to take on duties of industry advisory committee to Petroleum Administrator Chapman. . . .

INDUSTRY—Texas Eastern to build $117,800,000 natural-gas pipe line system from Mississippi to Pennsylvania. . . . ¶United Gas now operating new research laboratory in Shreveport. . . . ¶General Petroleum may construct large refinery in Oregon. . . . ¶Persian Gulf oil is challenge to Texas oil men, West Texas group told. . . . ¶Cement shortage in oil-producing areas may be alleviated by storms in East. . . .

EXPLORATION—More imaginative thinking needed in specifications required for wildcat prospects, Fort Worth regional exploration group hears. . . . ¶New shot-hole drilling method using compressed air instead of mud and water now being tested in West Texas. . . . ¶Gulf Refining introduces new wrinkle in marine operations with submersible tank-battery barge. . . .

PRODUCTION—Reduction of 70,000 bbl. daily in allowables for four Canyon Reef fields of West Texas ordered by Railroad Commission. . . . ¶Oklahoma and Kansas set allowables; Oklahoma production to be 488,000 bbl. daily during December and January; Kansas' to remain at 300,000 bbl. daily during December. . . .

ACTIVITY—Crude production for week ended December 2 averaged 5,760,350 bbl. daily, down 63,725 bbl. daily from previous week. . . . ¶Well completions dropped for third straight week to 765 wells compared with a weekly average of 913 for 4-week period ended November 18. . . . Wildcat completions totaled 147 compared with 169 for previous week. . . . ¶Rotary rigs operating in United States on November 27 decreased to 2,377 rigs from 2,393 a week earlier. . . .

TRENDS—Operators drilled more wells in the first 11 months of this year than in the full year 1949. . . . ¶Completions for week ended December 2 dropped under 800 wells for first time since May, but large number of rigs operating is indicator of good completion record for December. . . .

INTERNATIONAL—Socony-Vacuum issues schedules showing quotations for Arabian, Qatar, Iraq crudes. . . . ¶Tapline begins commercial operation with first shipments of crude from terminal at Sidon, Lebanon. . . . ¶Aramco to bring in Ain Dar field next year. . . . ¶Atlantic Refining concludes contract with Gulf for purchase of 12,000 bbl. daily of Middle East crude over 5-year period. . . . ¶France sets quotas on domestically refined lubes, motor fuel to be sold on domestic market. . . . ¶Soviet Embassy reports Russian oil production now running better than 20 per cent above prewar output. . . .

Oil-Import Quotas

Method of administering provisions under Venezuelan agreement expected to be announcd by State Department

Bertram F. Linz

WASHINGTON. — A State Department announcement of the method by which the oil-import quota provisions of the Venezuelan trade agreement will be administered is expected within a few days, with indications that it will provide for country allocations based on average imports between 1946 and 1949, inclusive.

The base period has not yet been actually determined and the department also must bring the matter up at Torquay, England, where more than a score of countries have been conferring since September 28 on reciprocal-trade matters, under Article 13 of the General Agreement on Tariffs and Trade which provides that any country putting a quota on imports shall consult with other parties to the agreement having an interest in the quota. Since the Netherlands, which has signed the agreement, has such an interest the Dutch Government must be consulted. There is nothing in the agreement, however, which prevents the imposition of quotas after such consultation, even though interested countries may protest, but the Netherlands is not expected to raise any determined objections.

Long delay.—The long delay in determining the method to be followed in handling the quotas of foreign oil to be permitted entry at the reduced import excise-tax rate of 10½ cents a barrel has been due to inability of the State Department to reach an agreement with the Venezuelan Government, which decidedly does not like the abrogation of the Mexican trade agreement, which after January 1 will result in application of the original 21-cent tax on maybe as much as 50 per cent or more of the Venezuelan oil sent to this country.

The department had hoped to be able merely to announce the quantity of oil which would comprise the quota (5 per cent of this year's throughput of continental refineries) on a catch-as-catch can basis, but Venezuela some months ago made it clear that would not be satisfactory, although no alternative was directly suggested. More recently, Venezuela indicated that country allocations, the method followed between 1939 and 1943, would be preferable, although it was made known the most desirable move would be a new agreement under which all oil would take the reduced tax rate.

More complex.—While the determination of country quotas was simple before the war, when the only supplying countries were Venezuela, Colombia, British West Indies, and Mexico, it is much more complex now because of imports from several Middle East sources. The Middle East has come into the picture in a big way only since the end of the war, and for that reason the department is expected to set the country allocations on a long-term base. It is pointed out that if 1946-47 was taken as a base, Venezuela would get a much larger share than if 1948-49 was taken, and conversely the Middle Eastern sources would get a much smaller share under the earlier base.

The allocations, when announced, are expected to cover the entire year 1949, and whether it will lead to a rat race between the importing companies competing in Venezuela to see who can get the most oil in under the quota will probably depend on how the companies feel they can rearrange shipping schedules and, possibly, on action which might be taken by the Venezuelan Government to prevent any one or two concessionaries from benefiting unduly at the expense of others. The State Department estimates that the total tax saving next year will be in the neighborhood of $8,000,000, not more than half of which, probably, will apply on Venezuelan oil, a sizable prize but one which many not warrant upsetting the normal international oil movement.

1946-49 imports.—The 1946-49 imports of crude aggregated 467,613,000 bbl., of which Mexico furnished 18,081,000 bbl., Dutch West Indies 19,021,000; Venezuela 331,175,000, Colombia 39,285,000, Iran 5,614,000, Iraq 1,107,000, Saudi Arabia 30,584,000, and Kuwait 22,746,000. The necessity for basing the quota on a long-term average is evidenced by the fact that in 1946 and 1947 practically all imports were from Venezuela, Colombia, Mexico, and Dutch West Indies; the first receipts from Kuwait were in 1946, from Saudi Arabia in 1947, and from Iran and Iraq in 1948. The Iranian movement, however, ran only from July 1948 to March 1949, and Iraq oil was received only in 4 months in 1948 and 2 months in 1949.

Resids, too.—The quota, however, applies to residual fuel oil as well as crude, the greater part of the former coming from the Dutch West Indies. Total imports of refined products, almost entirely fuel oil, for 1946-49 period were 251,727,000 bbl., and while the allocation for Venezuela would be favorable on the basis of crude alone it will be cut sharply by the overbalancing weight of the fuel oil.

Export Inquiry

Senator wants thorough study of control program

WASHINGTON.—Thorough investigation of the administration's whole export-control program and creation of a watch-dog committee to guard against recurrence of instances such as occurred this year when large quantities of petroleum products, steel, rubber scrap, and other war materials were exported to China was urged last week by Senator Herbert R. O'Conor of Maryland.

O'Conor, who headed a Senate group which recently investigated reports that large quantities of strategic materials had been permitted to reach communist China, told the Senate that the further his subcommittee goes into the matter "the more clear it becomes that for every ton of copper, steel, oil, chemicals, scrap rubber, medicines, or the like that we uncover and prevent from being shipped to China there are countless other tons still finding their way to North China ports."

The senator said two ways have been uncovered by which this traffic is moving—directly from this country to North China, sometimes by way of Japan; and from Japan and some European countries by transshipment, mainly at New York—and in addition direct shipments are being made of materials not officially classed as strategic but capable of being put to military or war industrial uses.

Oil products.—O'Conor charged that since September 1949, when the communists took over control of China, nearly 15,000,000 gal. of petroleum products, including approximately 5,000,000 gal. of gasoline, was shipped from the United States or the Middle East by American oil companies and affiliates.

"According to the oil companies," he told the Senate, "a voluntary agreement at the time of the Korean crisis has stopped further shipments of such products by them. However, early this year and continuing up even until August, oil purchased in the United States to the extent of 734,000 gal. was transported first to Japan and later reshipped to China. Petroleum products have gone forward likewise from the West Coast ports since the outbreak of the Korean war."

The proposed investigation of ex-

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port control policies would be conducted by the Senate Interstate Commerce Committee during the coming Congress and would be aimed at determining both the effectiveness of the Commerce Department's efforts to prevent the shipment or transshipment of exported materials to countries unfriendly to the United States and the extent to which, if any, American carriers are being utilized in such transportation.

NPC Recommendation

Group asks council to take on duties of an industry advisory committee to Petroleum Administrator Chapman

WASHINGTON.—A legal committee of the National Petroleum Council recommended this week that the NPC take on the duties of an industry advisory committee to Petroleum Administrator Oscar L. Chapman in addition to its present functions but specified it should continue to be headed by an industry man.

The report was based on a study of the Defense Production Act which provided that industry advisory committees shall be headed by a government representative, but the committee reached the conclusion that requirement was not involved in this situation since the council did not have anything to do with voluntary agreements which require the sanction of the attorney general.

The report was laid before Chapman, who indicated it coincided with his views and will work out the legal questions with the Department of Justice.

In an inch-thick study the NPC committee on petroleum and natural-gas transportation reported that existing and planned facilities are adequate to meet present and near-term known requirements. The full report was not made public because material on which it was based is classified, but it stressed the importance of completing the construction of "certain planned facilities." This completion, however, it is pointed out is conditioned upon the availability of steel and other materials in short supply, in some cases government action permitting accelerated amortization and many other contingent factors.

Transfer recommended.—The committee recommended that authority of petroleum barge and lake tanker facilities be transferred from the Defense Transportation Agency to the Petroleum Administration for Defense and called for construction of several thousand tank cars, explaining that 2,000 general-use cars are needed to meet peak shipments. Another 2,000 are required to take care of increased demand in 1951 and 3,000 will be needed to replace cars that will normally be dismantled. As of September 14 last, the report said, car builders reported that 1,093 general-use and 1,521 L.P.G. cars were on firm order.

The report held that in spite of the recent stringency in tanker supply, the situation will be cleared up by tankers freed by the completion of Middle East pipe lines and the completion of facilities now under construction or planned, but pointed out that nearly all of the vessesl now being, or to be built, are in shipyards outside the United States.

The estimated over-the-road tank-truck fleet is nearly three times what it was 6 years ago and the report expressed the belief that if wartime measures were adopted, such as 24-hour per day operation, 7 days per week, existing capacity could be increased 35 to 40 per cent.

Gas survey.—A survey of the natural-gas pipe-line situation led to the conclusions that Area 1 (New England) will be adequately supplied with natural gas in the near future; Areas 2, 4, 5, and 7 now have adequate supply of natural gas and will continue in that situation; Area 3 now has an adequate supply but may develop a deficiency in 1953 and 1954 amounting to possibly 337,000 M.c.f. daily; Area 4 has a small deficiency in capacity this year but will shortly have an adequate supply; and Area 8 has an adequate supply but by November 1952 may have a deficiency of 267,000 M.c.f. daily and a further deficiency of an additional 100,000 M.c.f. by the close of 1953 unless the Federal Power Commission authorization is secured for construction of additional facilities.

The existing systems of crude and products pipe lines, together with projects now under construction or definitely planned, will meet the present known foreseeable needs, the committee reported.

Steel committee.—The steel committee made a brief report that a spot survey of 250 companies developed that 74 per cent of the steel used in their activities was secured through regular sources, 6 per cent through conversion deals, 7 per cent in the gray market, 2 per cent through tie-in sales, 9 per cent was second-hand, and 2 per cent was imported.

The committee on petroleum storage capacity reported that 24 million barrels of additional capacity will be constructed during the last half of this year, over 60 per cent of it on the East and Gulf coasts. The committee found that at the present time there is storage for 432,318,000 bbl. of crude, including 11,733,000 bbl. heavy crude in California, but that approximately two-thirds is unavailable and is required for pipe-line fill and continuous operation, and operation of refineries.

The storage capacity for clean products was 348,000,000 bbl., approximately 41 per cent of which is unavailable for immediate use, and there was capacity for 106,000,000 bbl. of residual, 40 per cent of which is unavailable.

The committee drew no conclusions from these figures but L. S. Wescoat, chairman, expressed the personal opinion that capacity has not increased in proportion to demand in light of the war situation.

New studies.—The council agreed to two new studies requested by Oil and Gas Division director, H. A. Stewart. It will set up a committee to make a new study of present and probable future petroleum-productive capacity and availability to the United States, including gas as well as liquid petroleum, and foreign as well as domestic sources, and will also make a study of the essential requirements of the oil and gas industry for materials other than steel, such as copper, aluminum, zinc, cobalt, nickel, and sulfur.

During the course of the meeting, Chapman announced two new appointments to PAD: Cecil L. Burrill, as director of the program division, and Frank Watts as director of the materials division.

Steel Exports

I.P.A.A. seeks data on shipment of materials

WASHINGTON.—A series of questions designed to bring out details of Commerce Department policy on the exportation of materials for foreign oil developments was propounded to Secretary Charles Sawyer last week by Russell B. Brown, general counsel of the Independent Petroleum Association of America.

In a letter to Sawyer, Brown pointed out that domestic producers are suffering with a shortage of oil-field steel materials, particularly tubular goods, and indications are that this situation is continuously becoming more serious, but there are reports the department is continuing to authorize the export of large quantities of these materials, including large-diameter pipe for pipe-line projects.

"Producers are finding it extremely difficult to obtain supplies of tubular goods sufficient to carry on their program of exploration and develop-

WATCHING WASHINGTON

Bertram F. Linz

Export Control

The Economic Cooperation Administration and the National Production Authority will have control of exports for foreign-oil development, with the Petroleum Administration for Defense participating in discussions but not in decisions, according to current indications.

The difference of opinion as to what agencies should handle this phase of the defense program appears to have been settled in favor of ECA, which has contended that by reason of the Marshall plan it should have the deciding voice with respect to supplies of oil and equipment for the ERP countries.

The Office of International Trade made a strong bid for control and since it is part of the Department of Commerce of which the NPA also is a part undoubtedly will have great influence in dealing with programs for oil operations abroad.

The State Department and PAD do not appear to have made any contest for control and, with the military and other interested agencies, will content themselves with presenting their views through an interdepartmental committee. They will, however, have considerable effect on final decisions, which must take into consideration diplomatic, strategic, and domestic factors, and PAD will be in a position to support, oppose, or recommend programs for foreign-oil development.

'Lame-Duck' Session

President Truman has asked an apathetic lame-duck Congress to enact a long list of measures in the 3 weeks to which members planned to limit the session, but there are indications that he will get action only on matters pertaining to the war in Korea, although the increased seriousness of that situation may keep Congress in Washington to the end of the year.

The President listed as legislation of "greatest urgency" the appropriation of additional defense funds, aid to Yugoslavia, enactment of the excess-profits tax, extension of rent control, and statehood for Alaska and Hawaii, but only the first two appear to have any good chance of getting through.

From the standpoint of industry, the only measures of interest in this group are those amending the Clayton Act to control mergers accomplished by the acquisition of the physical assets of competing corporations, increases in postal rates, and the lifting of the import tax on foreign copper.

Foreign Oil Supply

Concern is being expressed in some government quarters over the apparent lack of planning against the possible loss of any foreign sources of oil supply in view of the serious situation in the Far East.

It is presumed that the Defense Department, as a routine matter, has evaluated those possibilities and developed plans against them, but there appears to have been little thought given the matter in other agencies.

PAD will probably survey this situation when it is sufficiently staffed to deal with matters other than those of immediate importance, but officials in other agencies are somewhat disturbed over the possibility of a sudden move on the part of the communists which might endanger Middle East oil areas.

There is considerable belief in some circles that our efforts in the immediate future should be devoted to the strengthening of Western Hemisphere oil development.

Outdoing the Skunk

The Bureau of Mines experiment station at Laramie, Wyo., is producing a chemical which it admits would scare off even a skunk and could make money at it if only a commercial use could be developed.

The chemical is isopropylmercaptan, which is sold by the American Petroleum Institute for $210 an ounce, a mere six times the value of gold, and the station has produced approximately 2 quarts of it, worth $14,000, some of which is used in studies and the remainder turned over to the A.P.I., which bottles it, odor and all, in vials of 1/6 of an ounce which are sold for $35 each to research laboratories, manufacturers of scientific equipment, and educational institutions.

The high price of the chemical is due to the fact that it is extremely pure and is essential in precisions equipment which makes tests for various chemicals found in petroleum.

ment," Brown said. "If this condition is not alleviated in the near future its effect will result in a curtailment of these activities which are basically essential to the maintenance and expansion of the nation's reserves of petroleum. In view of the international situation and the essentiality of petroleum to military preparedness, the nation cannot afford to permit this result to occur."

Plans limited.—"Since we are informed that steel production is now at capacity, whatever steel may be used for one purpose reduces the supply for all other requirements," Brown continued. "The plans and program of operations of the oil producers in the United States will therefore be determined and limited by the amount of steel that is going to be available to them.

"In view of this situation we would appreciate very much being advised with respect to the plans and program of the department concerning future applications for export of these materials. It would be helpful to know the policy considerations that are followed by the department in determining whether or not specific applications for export may or may not be granted and upon what basis and source of information the department relies in measuring the impact of its decisions upon the domestic industry. We are particularly interested to know how the department coordinates its oil-field steel materials export program with the Government's program under the Defense Production Act of assuring needed materials to essential industries."

Brown charged that one of the pipeline projects for which steel exports are sought "is primarily for transportation convenience and economic benefit rather than an increased supply of petroleum."

What it takes.—Meanwhile in Shreveport, Minor S. Jameson, Jr., assistant to the president of I.P.A.A., said it takes a pound of steel to find and produce a barrel of oil. He termed the present steel shortage "the most critical and immediate problem affecting oil and gas operations," and said that if petroleum is essential for defense, then steel (for oil-country materials) "is equally essential."

Jameson said that if officials who are directing the defense program want to make certain that the all-important oil is adequate, they have a formula as to steel on which they can depend.

The industry had consistently added a barrel of oil to the nation's reserves for each pound of steel used in the form of casing, tubing, and drill pipe, Jameson said.

"However, each barrel of oil produced requires an addition to reserves of 1½ to 2 bbl. if productive capacity is to keep pace with increasing consumption."

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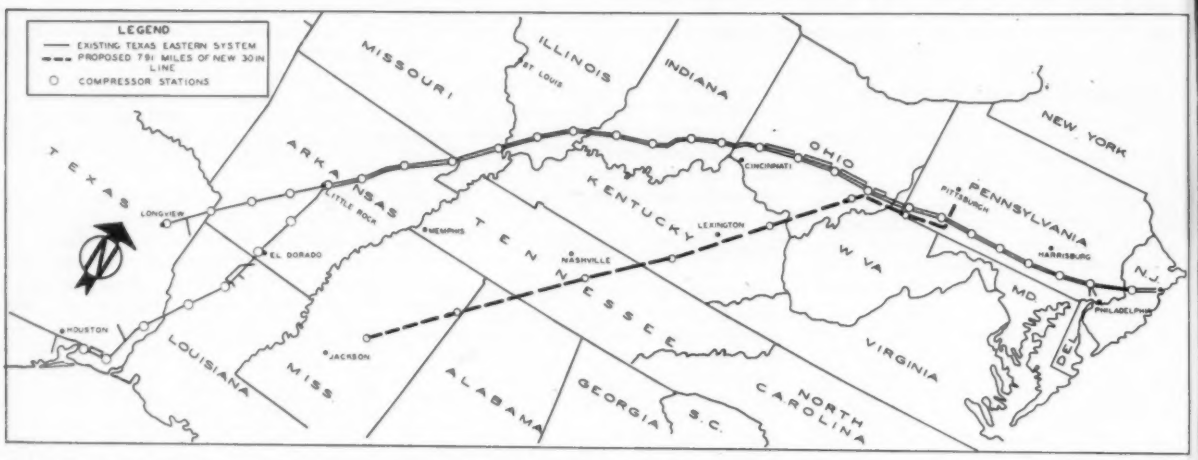

Map showing route of Texas Eastern Transmission Corp.'s 805-mile natural-gas pipe-line system, planned for 1951, from Mississippi to Pennsylvania. It will have an initial daily capacity of 476,000,000 cu. ft.

$117,800,000 Gas Line

Mississippi-Pennsylvania system with capacity of 476 million cubic feet daily is planned by Texas Eastern

Paul Reed

TEXAS EASTERN TRANSMISSION CORP. is preparing to build an 805-mile natural-gas pipe-line system from Mississippi to Pennsylvania which will be one of the major construction projects of the 1951 season. The project will supply 476,000,000 cu. ft. of gas daily to the New England area through the newly formed Algonquin Gas Transmission Co. and to present customers in Appalachian and Seaboard areas.

First pipe deliveries are due this month, and construction of the new facilities, to cost $117,800,000, will start promptly on receipt of Federal Power Commission approval which may come early next year, Texas Eastern said. Initial gas deliveries will begin within 1 year.

The new project will consist of 791 miles of 30-in. from Kosciusko, Miss., to the Oakford storage field which is 35.7 miles north of the Connellsville, Pa., station, on the existing Big Inch and Little Big Inch lines now operated by Texas Eastern for gas transmission. In connection with the project there will be 13 compressor stations with a total of 98,900 hp., seven of which will be on the new line and six on the existing system at locations east of Connellsville.

Capacity increase.—The additional throughput of 476,000,000 cu. ft. daily to be provided by the new system will increase capacity of the entire Texas Eastern system to 1,216,000,000 cu. ft. daily.

It now appears that Algonquin Gas Transmission Co. may receive a certificate for less than the 260,000,000 cu. ft. daily specified in its original application. However, this would not modify the Texas Eastern program. Allocation of additional gas is subject to approval of FPC.

Texas Eastern has contracted with United Gas Pipe Line Co. to purchase almost all of its requirements for the new project, 134,000,000,000 cu. ft. annually, for delivery at connections near Kosciusko, Miss. Total annual sales through the new facilities would be approximately 142,201,000,000 cu. ft. annually.

Compressor stations.—The seven compressor stations on the new Kosciusko-Connellsville 30-in. line will all be equipped with reciprocating units totaling altogether 46,400 hp. These will be located at Kosciusko, Miss.; Red Bay, Miss.; Murfreesboro, Tenn.; Columbia, Ky.; Vanceburg, Ky., and Beverly, Ohio. The six new stations to be built on the existing Texas Eastern system will have a total of 52,500 hp. Location, designation, and types of equipment are indicated as follows: At Connellsville, Pa., No. 21, existing pump station facilities to be converted for reciprocating compressor station; Bard, Pa., No. 22a, new centrifugal compressor station; Chambersburg, Pa., No. 23, to be converted to centrifugal compressor station; Marietta, Pa., No. 24, to be converted to centrifugal compressor station; Phoenixville, Pa., No. 25, to be converted to centrifugal compressor station; and Lambertville, N. J., No. 26, to be converted to reciprocating compressor station. Conversion will be from centrifugal pump stations installed for crude oil and products for World War II operation.

Nine stations.—This compressor program thus includes nine stations of reciprocating type of which seven will be new while two will be conversions from existing centrifugal pump stations. The four centrifugal stations include one new and three so-called "converted stations."

The new stations will increase Texas Eastern's compressors to a total of 376,050 hp., of which 145,300 hp. will be reciprocating and 230,750 hp. centrifugal.

Underground gas-storage facilities in the Appalachian area will permit Texas Eastern to operate its entire system at an annual load factor of 97 per cent.

Compact to Meet

HOUSTON.—Bruce K. Brown, newly appointed deputy administrator of the Petroleum Administration for Defense, and Lt. Gen. Ernest O. Thompson of the Texas Railroad Commission, will be among the major speakers at the annual meeting here December 11-13 of the Interstate Oil Compact Commission.

The 3-day program is designed to commemorate the fifteenth anniversary of the compact. Thompson's address will review the record of the body during its 15 years of existence. Gov. Roy J. Turner of Oklahoma, present chairman of I.O.C.C., has issued a special invitation to those who participated in the founding.

Among those who participated in the formation of the commission are: Alf M. Landon, William P. Cole, Jr., George R. Marland, Frank Vesely, W. J. Holloway, Mac Q. Williamson,

Exterior view of United Gas System's newly opened research laboratory on the outskirts of Shreveport.

Northcutt Ely, Wirt Franklin, H. C. Bretschneider, Warwick M. Downing, Tom Anglin, James V. Allred, John W. Olvey, Ralph J. Pryor, E. B. Shawver, Patrick J. Hurley, Pierre La Fleiche, Hiram M. Dow, and Jack Blalock.

Dan O. Howard, Warren Petroleum Corp., Tulsa, will address the I.O.C.C. engineering committee on natural gasoline plants as a conservation measure.

New Laboratory

United Gas' Shreveport facilities in operation

Joseph A. Kornfeld

SHREVEPORT. — Functionalism, flexibility, and simplicity are features of United Gas System's newly opened research laboratory here, which is capable of handling any type of industrial research.

The building is a single-story brick structure, with three main wings, and contains a total of 14,500 sq. ft. of floor space. More than half of this is devoted to actual laboratory work, and represents more than seven times the amount of floor space provided in the former laboratory building.

Eight functional laboratories are devoted to separate sections on physics, electronics, research chemistry, chemical engineering, research P-V-T (pressure-volume - temperature), development P-V-T, production, chemistry, and development. In addition, four smaller labs are available for conducting special projects.

Flexibility.—Extreme flexibility is reflected in the design of each laboratory. The floor plan and size of each of the rooms were standardized, and with the exception of certain special equipment, furniture is comprised of a few basic units, all of which are interchangeable. Each unit consists of a large laboatory and two adjoining smaller lab rooms, with each unit designed for four men.

Special steel partitions and transite walls were installed to make the building fireproof, and safety showers, extinguishers, and other safety measures have been provided. All inflammable fluids are stored in a small house behind the main structure.

Electronics. — Most unusual room in the building is an all-shielded electronics laboratory, where instruments can be used without possibility of outside natural interference. Walls, ceiling, and floors were lined with copper foil to isolate the room from all external disturbances.

Two new movable transitone partitions which obviate the need for exposed piping are featured in the building. Multipurpose air conditioning maintains constant temperature and humidity level throughout the laboratory. Also incorporated in the research department is an extensive library.

Studies. — An important electronic study now under way concerns application of telemetering and remote control by use of carrier currents on wire telephone lines and on microwave radio-relay links. Other projects include: development of an instrument to detect presence of small amounts of water vapor in high-pressure gas; devising a method to dehydrate absorber oil; means to reduce dust in pipe lines; study of fundamental conditions in hydrocarbon mixtures, improved methods of hydrocarbon analysis, and recombination of oil and gas samples at bottom-hole conditions; a study of flow of fluids through porous media, now in progress in the physics section, and finding the means of chemically controlling unwanted vegetation along pipe line rights-of-way, now under study in the chemistry section.

WEST COAST

Oregon Refinery Planned

PORTLAND.—Although beginning of construction is some time in the future, plans for the erection of a large refinery in this area were made known here last week by a General Petroleum Corp. spokesman.

Speaking before the Pacific Supply Cooperative in its annual meeting, V. A. Bellman, General Petroleum's vice president in charge of marketing, said the company hoped to be the first to come into the Pacific Northwest with a large refinery. Just where it will be located, its exact size, what kind of refining process will be employed, and other details are now being studied by company economists.

He said its size might run "anywhere between 25,000 and 50,000 bbl." daily capacity, and indicated its cost would be in the neighborhood of $25,000,000. The refinery would operate on Canadian crudes, which he prophesied would be flowing into the Pacific Northwest within 2 or 3 years.

Refinery Suit Filed

LOS ANGELES.—First suit in which a single oil refinery was charged as being the cause of crop damage and destruction, through allowing noxious fumes to pollute the atmosphere, was filed in federal court here last week. The action, taken against General Petroleum Corp., also was novel in that it asked an injunction to halt operations of the company's large Torrance refinery.

Filed by Fred and Elsie King, wholesale flower growers, the suit alleged that large amounts of their crops on properties adjacent to the Torrance plant had been damaged by fumes released by the refinery at various times between August 1948 and last May. They asked damages totaling $183,987.

Because all large refineries in the Los Angeles area, including the Torrance plant, have installed facilities for cleaning their waste gases, they have been given a clean bill of health by smog-control authorities. On several recent days, however, inhabitants have been smog-groggy as they experienced some of the worst attacks ever.

For this reason the new action is regarded by some people associated with smog-control work as being little more than a nuisance.

Levee Lease Awarded

LOS ANGELES.—An 80-acre proved oil lease in the North Coles Levee field of Kern County was awarded D. D. Feldman of Dallas last week. His successful high bid was a bonus of $50,011.27 in addition to the normal one-eighth royalty.

Located inside the field, the lease heretofore has not been developed because it is located inside the Elk Hills Naval Petroleum Reserve. It was offered for lease when the Government determined that it was part of the Coles Levee structure and probably would be drained. Production, probably gas condensate, is expected in the Stevens zone at about 8,000 ft.

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Exploration Conclave

More imaginative thinking in specifications required for wildcat prospects advocated at Fort Worth meeting

Philip C. Ingalls

FORT WORTH.—The need for more imaginative thinking in the specifications required for wildcat prospects was advocated here last week by Ira H. Cram, vice president in charge of exploration and production for Continental Oil Co., before 1,000 exploration scientists gathered for a 2-day meeting.

Cram, in the opening address of the session, emphasized the need for more wildcats if the country is going to keep up with expanding demand for oil, and stated that the only way to get these wildcats was through application of more imagination by the "oil finders" of the nation. He did not ask geophysicists to imagine reflections, or the geologist to drill a hole on every wiggle of a contour line. Nor did he ask for a tremendous "random" drilling program. He did say, however, that what he wants to see is more controlled geologic imagination in interpretive work resulting in more wildcats.

Cram's proposal was most appropriate for this meeting. The program was designed for the purpose of exchanging ideas on the approaches to the problems of finding oil accumulation in five of the Southwest's basins that have defied efforts to make them give up more than a small percentage of the oil they are believed to contain. *(See "Basins of the Southwest," page 133 of this issue.)*

The meeting, sponsored by the Fort Worth Geophysical Society, the Fort Worth Geological Society, and geophysical societies of Dallas, Tulsa, Ark-La-Tex (Shreveport), and Permian Basin (Midland), was outstanding in organization. Its arrangement of dovetailed geological and geophysical papers on Oklahoma, Texas, and New Mexico's little-known basins was something new and is likely to have established a lasting pattern for other regional meetings.

Technical papers.—Among the 18 technical papers presented at the meeting, 11 were on the southwest basins, 5 geological and 6 geophysical.

Berte R. Haigh, University Lands, Midland, discussed the geology of Delaware basin. Papers on the geophysics of this basin were presented by W. A. McFadden, Jr., Standard Oil Co. of Texas, Midland; and H. Wayne Hoylman, consultant, Los Angeles.

The responsibility of the exploration scientists to find a continuing low-cost supply of oil and gas for our country's energy requirements was told by Charles J. Deegan, Cummins & Brinkerhoff, Fort Worth. Deegan emphasized the need for more study of the natural conditions that permit the major oil or gas accumulations which supply most of this country's energy and net profit.

R. V. Ward, Shell Oil Co., Oklahoma City, discussed the stratigraphy, areal distribution of important rock groups, and the presently known types of producing traps in the Anadarko basin. Paul L. Lyons, Carter Oil Co., Tulsa, presented a paper on all phases of the geophysics of the basin. Lyons blamed the poor seismic results obtained in much of the basin area for retarding exploratory drilling.

Reynosa field.—Diverging from the general theme of the meeting was an interesting paper on the geophysical history of Reynosa, northeastern Mexico's first oil field by Antonio Garcia Rojas, Petroleos Mexicanos, Mexico City, and J. W. Thomas, Geophysical Service, Inc., Dallas.

"Geology of the Northwestern Shelf Area" by W. A. Waldschmidt, Argo Oil Corp., and L. T. Brown, Pure Oil Co., both of Midland, was presented in conjunction with "Seismic History of Southeastern New Mexico" by A. I. Innes (read by Francis Campbell), Amerada Petroleum Corp., Tulsa.

Plainview basin was discussed by Robert Roth, Humble Oil & Refining Co., Wichita Falls, who presented the paleogeological history of what he termed "the largest dry-hole area in Texas." He was followed by a presentation of the geophysical problems in the area by W. P. Harvey, Geophysical Service, Inc., Dallas.

A combined geological and geophysical paper on the area of southern Arkansas, Northeast Texas, and Northwest Louisiana was presented by Carl L. Bryan, Gulf Refining Co., Shreveport. Though this area has produced great quantities of oil, it still contains many unexplored possibilities, especially around known salt domes.

Tough to crack.—Down in the far southwest corner of Texas is a basin that is going to be the toughest of all to crack. According to Ronald K. DeFord's paper, Marfa basin's violent post-Cretaceous history makes this basin more difficult to work than others to the north. The geophysical problems of Marfa basin were discussed by J. H. Wilson, Independent Exploration Co., Fort Worth.

Other speakers at the meeting

A few of the leaders of Fort Worth's joint regional exploration meeting. Left to right, back row: J. F. Johnson, Sinclair Oil Co., Fort Worth; Carl L. Bryan, Gulf Refining Co., Shreveport; Paul L. Lyons, Carter Oil Co., Tulsa; George E. Wagoner, Carter Oil Co., Shreveport; R. F. Bennett, Sohio Petroleum Co., Houston. Front row: F. M. Ricks, Southland Royalty Co., Fort Worth; Robert Baum, Seismograph Service Corp., Shreveport; J. L. Morris, Pure Oil Co., Fort Worth; G. H. Harrington, Jr., Independent Exploration Co., Fort Worth; and John R. Crump, Gulf Oil Corp., Fort Worth. Wagoner is president of the Society of Exploration Geophysicists and Lyons is a nominee for editor of that national society.

were F. G. Boucher, Carter Research Laboratory, Tulsa, on "A New Dip Logging Method," and L. Y. Faust, Amerada Petroleum Corp., Tulsa, on "Seismic Velocity as a Function of Depth and Geologic Time." A paper by John Daly, General Geophysical Co., and C. N. Page, Honolulu Corp., both of Midland, told how seismograph interpretation is related to changes in the sedimentary section in West Texas and New Mexico. The "Seismic Velocity Problem in Western Mississippi Embayment" was discussed by O. B. Manes, Shell Oil Co., Houston, from a paper prepared by Manes and P. L. Terrasson, also of Shell, Houston.

Persian Gulf Oil

Competing with it on world and domestic markets or in battle is challenge facing Texas oil men, Thompson says

Roy F. Carlson

ABILENE, Tex.—The challenge facing Texas oil men today is that of Persian Gulf oil — of competing with it on world and domestic markets or on the battlefields should Russia take over the prolific fields in the Middle East.

This warning was issued to oil men gathered here for the annual meeting of the West-Central Texas Oil and Gas Association last week by Lt. Gen. E. O. Thompson of the Texas Railroad Commission.

Thompson quoted world-production statistics to show the position of Texas and the United States relative to that of the rest of the world. He called attention to Abqaiq field in the Middle East where 45 wells are producing 45,000 bbl. of oil daily compared to a 14 bbl. per day average in the United States or a 20 bbl. per day average in Texas. He added that a reserve of 27 billion barrels has been discovered near the Persian Gulf compared to 25 billion in the United States. Because of these tremendous reserves and the low producing cost of the Middle Eastern oil, he predicted that some day the basing point for pricing crude would shift from the Gulf Coast of Texas to the Persian Gulf.

Russian objective. — Thompson also stated that he thought that one of the prime objectives of Russia was the flush area of the Persian Gulf and that the Russians were making an end run in Korea. The area could easily be occupied by Russia, he said, and Russian sympathizers working in the oil fields and refineries would prevent destruction of any of the facilities there if Russia invaded the area. Lt. Gen. Thompson is commander of the Texas National Guard.

Market for area oil.—Most of the session was devoted to subjects of interest locally to the West-Central Texas oil men. Jack Levering, general manager of Onyx Refining Co. in Abilene, said that the area was in a poor position geographically — being located between the huge reserves of West Texas and the refining centers of the Gulf Coast and the Chicago area. This location makes crude oil from the area subject to an adverse pipe-line-tariff condition, making its delivered price higher at the Gulf Coast than East Texas or Scurry County crude and equal to North Texas crude. In the Chicago area, West-Central Texas crude is higher in delivered price than crudes from Scurry County, North Texas, Oklahoma, or East Texas.

Aggravating this situation is the fact that no new transportation facilities are scheduled for the future, and the fact that the local market cannot absorb excess produced oil—so that every new well must take part of the market from an older well. The impact of the tremendous production from the Scurry area was felt deeply in West Central Texas, Levering said.

Scurry area.—W. L. Horner, chairman of the Scurry County engineering committee, the chief engineer of Sunray Oil Corp., Tulsa, outlined progress made in the development and production of the prolific Canyon reef fields of Scurry County. There are at present, he said, approximately 1,500 reef wells with the fields being about 90 per cent drilled up, except for the Sharon Ridge Canyon field.

Some of the conclusions drawn so far, Horner said, were that there has been no water drive evidenced at any rate of production, and that, in general, areas of greater thickness have shown a smaller pressure drop per well. The present production rate, he said (this was recently cut by the Texas Railroad Commission) is one fifty-thousandth of the oil in place. As a result, Horner said, it will take 40 years to deplete primary reserves.

Engineers for operators in the area, he said, are vitally interested in obtaining maximum recovery from the fields. He pointed to the more than 11,000 core analyses that have been run and to the series of pressure surveys that have been started. He also mentioned the pilot water flood of Lion Oil Co. in Diamond-M field.

Tubular - goods forum. — A tubular-goods forum conducted by E. I. Thompson, of the Texas Independent Producers and Royalty Owners Association, and Bryan W. Payne, of the oil field materials committee of the Independent Petroleum Association of America, laid shortages of oilfield tubular material at the door of strikes in the steel and coal industries. Payne suggested that if an additional 500,000 tons of steel were allocated to the oil industry, there would be enough pipe to drill the estimated 40 to 42,000 wells required in 1951.

The forum developed that unless an operator has had customer relations with a supply company there is little hope that he will receive tubular goods unless the steel is allocated by the Petroleum Administration for Defense.

The present gray market that exists in tubular-goods sales, Payne said, is not being supplied from regular channels but rather gets its goods from operators who have sold a supply of steel that was on hand before the present situation.

Runnels County.—The increasing importance of Runnels County in West-Central Texas oil production was reviewed by Joe L. Tompkins, Abilene consulting geologist. There are now over 200 wells in the county, with about 70 of these in Fort Chadbourne field which is producing primarily from the Odom lime, but which has several pays behind the pipe. The 200 wells are producing from 18 different pay horizons. Several new fields were brought in in 1950.

Primary oil recoveries of 28,000,000 bbl. will be obtained from Salt Creek field in Kent County, according to W. L. Day, district geologist for General Crude Oil Co. There are at present about 45 wells in this field, he said. For Kent County as a whole, Day said that there are more than 100 wells producing from the Canyon reef, Strawn, Ellenburger, or Wolfcamp formations.

Officers of the association for 1951 will be the same as for 1950: French M. Robertson, Abilene, president; J. C. Hunter, Jr., Abilene, vice president; Lester Clark, Breckenridge, vice president; and Robert J. Tiffany, Abilene, secretary.

Allowable Cut

Canyon reef fields to produce 100 bbl. per well

AUSTIN.—A reduction of 70,000 bbl. a day in the allowables for four important Canyon reef fields in West Texas was ordered last week by the Texas Railroad Commission. The order, effective as of December 1, supplemented a previoulsy ordered state-wide proration cut of 160,000 bbl. daily.

Per well allowables were lowered from 160 bbl. to 100 bbl. per day per well for the Cogdell area of Kent County, Kelly-Snyder, Diamond "M"-

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Canyon, and Sharon Ridge-Canyon reservoirs of Scurry County. Since Texas fields are subjected to 11 shutdown days during December, the actual calendar-day average allowable will be 65 bbl. per day per well for these Canyon reef fields.

The order was based on evidence taken at a hearing held here on November 3 at which time oil operators from these fields testified on reservoir conditions, the effect of production rates on reservoir pressure, reduction of gas-oil and water-oil ratios, prospects for water injection, the quantity of gas available for pressure maintenance, and other factors. The commission found that all of these four fields produce from a common source of supply. It stated that, unless steps are taken to preserve dissolved-gas producing energy, ultimate recovery will be low. Commissioner William J. Murray, Jr., has said in recent weeks that present methods are recovering less than 20 per cent of the oil in place from the Canyon reef and cited the great declines in reservoir pressure since discovery of these fields *(The Oil and Gas Journal, November 2, 1950, page 43, and October 5, 1950, pages 126-127).*

Analyze drive.—Another purpose for the sharp reduction in allowables from the Canyon reef fields is to determine whether or not a water drive exists. In addition, the commission ordered a 3-day shutdown period of this vast reservoir commencing January 1 for conducting a bottom-hole pressure survey. Data obtained from this survey will enable a correlation of the effect of lowered withdrawal rates on the decline in reservoir pressure and thereby determine whether or not extraneous energy is contributing to reservoir performance.

Waste cited.—The 1,490 oil wells producing from this reservoir are flaring 100,000 M.c.f. of solution gas daily, the commission said, adding that this amount is equivalent to 5,100 bbl. of liquid hydrocarbons daily.

New Drilling Method

Shot-hole unit utilizes air instead of mud, water

FORT STOCKTON, Tex. — A successful shot-hole drilling operation which utilizes air instead of drilling mud and water is being carried out by the drilling-contracting firm of Morrison & Peachee in an area near here.

Using a Failing 1500 Holemaster Drill, 4½-in. holes are being drilled to an average depth of 200 ft. Average drilling time per hole is 3 hours, or a little over 1 ft. per minute.

Under ideal conditions, the drilling rate with the air method generally is proving equal to conventional drilling with circulation. Experiments with air drilling have spread widely throughout the United States, and some work is being done along this line in Canadian areas.

This shot-hole drilling unit uses compressed air instead of mud and water, in drilling 200-ft. holes in Southwest Texas. Note pile of dust around hole.

The experiments thus far have proved that air drilling is practical for holes that are dry all of the way, and also for wet holes if they are not deep. The method has been found to be more or less impractical only when the formations are wet enough to become pliable and sticky.

Longer bit life. — Cutting teeth and bearings of rock bits used in the air drilling have a noticeably increased life compared to those used in circulation drilling. This is in part explained by the fact that the cuttings are removed almost instantly from the hole.

Failing engineers who have been following this comparatively new method of drilling closely for the past year point out that the expense of operating a compressor unit in connection with the drill is greater than the cost of operating a water truck and slush pump. The air compressor is a heavy piece of equipment, and it also presents portability problems.

Dust causes trouble.—Dust has been a handicap, but a new method is being developed which will discharge the dust away from the drilling area.

In certain areas such as the Edwards Plateau where the cavernous formations have presented many problems in conventional drilling due to the inability to maintain circulation, the air method is proving to be successful. Rotary drills using the air method are out-performing spudders in this area now.

In its present stage, air drilling for exploration purposes is more costly than the conventional system, which is due in part to the fact that the compressor unit requires more horsepower than can be supplied by the average truck engine. Therefore, the unit must have its own power source, which adds to operating expense.

A.I.M.E. Meeting

All-Texas group studies natural-gas industry

LUBBOCK, Tex. — Papers dealing with the natural-gas industry, its relationship to the petroleum industry and its needs for the future, were featured at the 2-day session of the all-Texas-sections meeting of the Petroleum Branch, American Institute of Mining and Metallurgical Engineers, held here last week.

D. A. Hulcy, president, Lone Star Gas Co., prepared a paper, but due to his unavoidable absence it was presented by L. T. Potter, Hulcy's assistant. This study stressed the importance of teamwork and cooperation in all industry.

A companion paper presented by Harold L. Hensley, Humble Oil & Refining Co., Midland, described the natural-gas industry as one that has achieved huge size in just a few years of growth, and one that has enormous potentialities for the future.

Max K. Watson, Amarillo natural-gas consultant, described a favorable future for natural-gas engineers, saying the industry has expanded at such a rapid pace that the demand for engineers experienced in natural-gas operations exceeds the supply.

Gasoline plant.—A further example of results obtainable through coopera-

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tion of gas and oil operators was given by T. C. Williams, Honolulu Oil Corp., Midland, who illustrated that one gasoline plant was being overtaxed at times and running far under capacity the remainder of the time, due to the high rate of gas delivery during the day, and the near absence of deliveries at night, on week ends, and near the end of the month. Fluctuations came as a result of changing oil production. The 60 oil operators involved cooperated with gasoline-plant operators and have not only permitted the gasoline plant to operate efficiently, but have increased their revenue and forestalled flaring of gas in support of stop-flaring orders.

Others appearing before the group were: James Conway, Carl B. King Drilling Co., Midland, who stressed importance of conferences between employes; David B. Schulz, George P. Livermore, Inc., who discussed training programs; Dr. George Whetstone, Texas Technological College, who reviewed development of high-pressure pipe; Waldo Grossman, Halliburton Oil Well Cementing Co., who explained cementing procedures; and Henry W. Hinkle, Stanolind Oil & Gas Co., who outlined trends and practices in the electrification of oilfield pumping.

Dr. Waldo Stephens, Oklahoma City oil man, warned the group that we no longer have a choice about World War III. He said we are in it and only astute statesmanship can save us. He touched on various international problems, including the Korean War and use of the atomic bomb.

Cement Shortage

Eastern storms may free more for oil-area use

Leigh S. McCaslin, Jr.

HOUSTON.—Oil operators may indirectly benefit from the disastrous storm which recently swept the East Coast. This paradox results from the possibility that the cement scarcity—which has been critical—may ease with the curtailment of construction activity in the East.

Demand for cement has reached such proportions in recent weeks that many oil wells in West Texas are circulating as much as 72 hours while waiting for the cement trucks to arrive. One oil-well-cementing company is shipping cement from as far away as Utah to fill the West Texas demand.

The shortage is not confined to the West Texas area. Difficulties are being experienced in other parts of Texas, and reports indicate that the supply is short in other oil-producing states, particularly Louisiana.

Like so many other commodities, the shortage is not the result of declining production, but of greatly increased demand. The consumption of cement is at an all-time high in the United States. Last year set a record which seems certain to be bested this year. In the first 9 months of 1949, the United States consumed 156,018,000 bbl. of cement. For the same period of this year, the figure stands at 171,353,000 bbl.—a 9.8 per cent increase.

Texas demand.—The increase in demand is even more pronounced in Texas — the leading oil-producing state. Consumption for the first 9 months of this year stands at 12,336,900 bbl.—a 27.2 per cent increase over the same period in 1949. Oklahoma consumption is up 19.5 per cent and Kansas 20.4 per cent.

A higher nation-wide rate of drilling has had its effect on the cement situation. As of November 18, well completions for the year were 38,059 nation-wide as compared with 34,098 at the same time last year. This represents a 12 per cent increase in drilling activity.

Priority orders from the Government for defense purposes have had their effect. Delivery schedules of the cement mills have been disrupted and civilian consumers have suffered. The mills are operating from flow streams, in most cases, as all storage has been depleted.

More deep wells.—Another factor has been the trend in oil-well cementing toward increased amounts per well. More deep wells requiring more cement are being drilled. Also, research of recent years has indicated that drill holes are larger, in many cases, than formerly thought. Thus more cement is being used to insure a good job.

The severe West Texas shortage can be attributed to several factors. In the first place, the active play in the Canyon Reef area has pushed well completions far ahead of last year. Through November 18, 4,404 completions had been made—an increase of 52 per cent over 1949. In addition, much of West Texas is not convenient to a mill. There are no mills between Fort Worth and El Paso.

Proximity to a mill has become important to cement consumers. The federal Government has outlawed the basing-point price system formerly used by the cement industry. Under this system the manufacturer absorbed freight costs and these were included in the price of the cement. Now, cement is quoted at the mill and the purchaser is required to pay the freight to the point of use. As a result, the manufacturers tend to concentrate on building up steady customers in their immediate trade areas.

Relief expected.—Some relief can be expected for West Texas upon the completion some time in 1951 of a large new mill near Sweetwater, in Nolan County. It is being built by Lone Star Cement Corp. and will have an annual productive capacity of between 5 and 6 million sacks.

Cementing companies are being offered cement from Belgium, Germany, and Mexico. However, little has been purchased because of indeterminate quality and high cost. There is some activity in the "gray" or black market.

States Set Allowables

The Oklahoma Corporation Commission has increased the state's daily crude-oil allowable to 488,000 bbl. for December and January, and the Kansas Corporation Commission has announced that that state's December crude-oil output will be held to 300,-

Tons of cement, now hard to get in various oil-field areas, are required for the average drilling well. With no squeezing, a representative Mid-Continent well will require about 1 carload (1,600 sacks), and in West Texas this figure increases to 1½ carloads (2,400 sacks). Some wells in West Texas take as much as 12,000 sacks for a cementing job. This view is typical around a rig just before cementing operations begin.

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000 bbl. daily for the sixth consecutive month.

The Oklahoma allowable compares with a November production of 477,960 bbl. daily, and a U. S. Bureau of Mines demand forecast of 468,000 bbl. daily.

In Kansas, purchasers' nominations totaled 330,310 bbl. daily, an increase of 2,422 bbl. over the November requirements. The Bureau of Mines has forecast a demand of 306,000 bbl. daily.

GULF COAST

Offshore Equipment

Gulf Refining to use new submersible tank battery

HOUSTON. — Gulf Refining Co. is introducing a new wrinkle in marine operations with a submersible tank - battery barge currently under construction at Beaumont, Tex.

While submersible drilling barges have been in use for Gulf Coast water operations for the past 15 years, this is believed to be the first submersible tank battery. When completed, it will be put to use in the Black Bay field of Plaquemines Parish, Louisiana, 50 miles southeast of New Orleans. The field is 1 mile from the nearest dry land, and the barge will be situated in 7 to 8 ft. of water.

In brief, the tank battery consists of two rectangular structures, one supported over the other by means of 12 20-in. o.d. pipe columns. The bottom structure is flooded to sink the battery to the bottom. The top structure is used for crude storage and is divided into six compartments, each with a capacity of 800 bbl. The bottom part measures 80 ft. by 52 ft. by 5 ft. 4 in. while the tank battery section has dimensions of 72 ft. by 48 ft. by 8 ft. 4 in. Both sections have a 4-in. camber.

Deck section.—Gulf will mount three oil and gas separators, one pump, and piping on the deck of the tank-battery section. The pump will be used to transfer the produced oil from the battery to a tow barge. The tank-battery barge will be held in place by a spud at each corner operated by a hand winch.

The tank-battery barge was designed and built by Bethlehem Steel Co. at its Beaumont yard. A similar vessel is on order for Atlantic Refining Co.

Gulf Refining recently put into service three submersible barges, each mounting a gas-compressor station, which is regarded as a significant step in offshore operations on the Gulf Coast. The three barges, each capable of handling 15,000 M.c.f. of gas daily, are seeing service in Quarantine, West, and Grand bays in South Louisiana.

Origin of Oil

It may be found in phase relations of hydrocarbons

HOUSTON.—Bottom-hole pressures up to 18,000 psi. and temperatures as high as 811° F. are believed to represent physical conditions at 8-mile depths at the lowest geologic contours of the Gulf of Mexico in southwestern Louisiana.

C. L. Moody, president of the American Association of Petroleum Geologists, Shreveport, told members of the Houston Geological Society here last week that "we must study the phase relationships of hydrocarbons in connection with great depths to account for the origin of oil."

The Shreveport geologist, who has studied the Gulf Coast geologic history for the past 30 years, called attention to a belt of ancient volcanic activity extending across southern Arkansas, Mississippi, Alabama, Georgia, and into the Florida Peninsula. This belt, known from petrographic studies of wells drilled in search for oil, may throw new light on the age of the basement rocks that underlie the Gulf embayment.

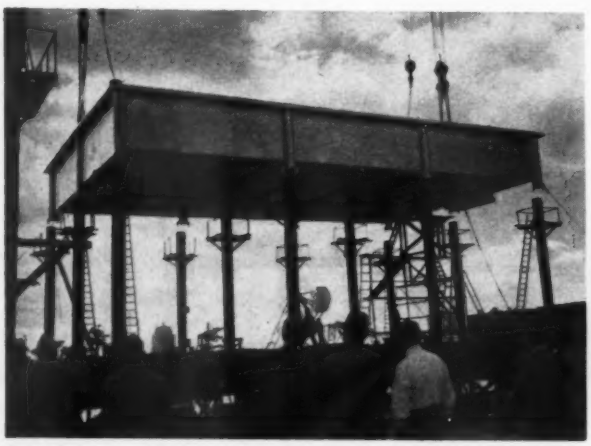
Previously held concepts on the age of certain major geologic events may be changed in th light of this data. For example, the Palisade revolution, recorded in geologic textbooks as late Triassic, would be placed in the late Jurassic.

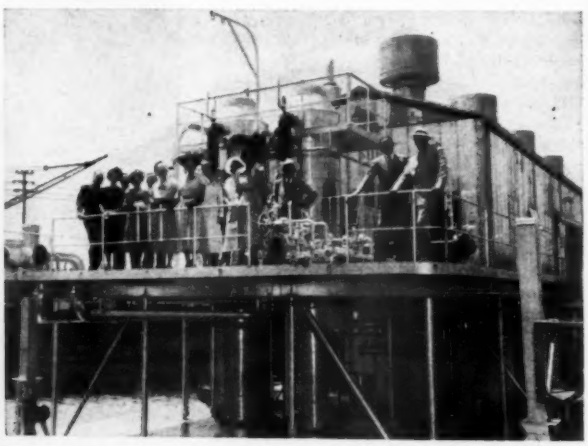
Ancient land mass.—A new concept postulated by the Shreveport geologist was the existence of an ancient land mass of Miocene age in the Gulf of Mexico to account for the source of widespread gravel beds of late Pliocene age which were laid down across the entire Gulf Coast.

Paul Weaver, chief geophysicist, Gulf Oil Corp., Houston, in discussing the paper, said that the Midway formation of lowermost Eocene age represented one of the most uniformly deposited formations to be laid down in the Gulf Coast and that its thickness was remarkably consistent. Significant downwarp occurred since Midway time with rates of dip changing from 400 ft. to the mile to 150 ft. to the mile.

Ouachita geosyncline.—Moody termed the Ouachita Mountains as a local geosyncline, and separate from the Appalachian geosynclinorium. The Ouachitas were truncated during early Pennsylvanian time while the Appalachians were eroded at a somewhat later time period.

The downwarping of the southwestern extension of the Appalachians and the southern front of the Ouachitas preceded the great marine invasions that account for the vast thicknesses of coastal sediments estimated from 42,000 to 47,000 ft. by J. Ben Carsey, Moody cited. "The Appalachians extended gulfward indefinitely," the Shreveport geologist said, adding that "the Gulf anomalies are of the type found in the Ouachita front."





A new submersible tank-battery barge, left, is shown being assembled at the Bethlehem Steel Co.'s Beaumont, Tex., yard for Gulf Refining Co., which will be used in operations off the coast of Louisiana. At right is shown one of three submersible barges each mounting a gas-compressor station, now in use by Gulf Refining in Gulf Coast waters. Photo was taken at time of christening ceremonies.

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Tidelands Rental to U. S.

HOUSTON.—The tidelands issue is once again a major topic in the Gulf Coast after a long dormant period following the Supreme Court's adverse decision for the states of Texas and Louisiana.

At Baton Rouge, the Louisiana Register of State Lands reported that four oil companies holding offshore leases have paid rental money of $279,000 to the federal Government. The registrar, Miss Lucille May, described this as "the first blow." "We will have more to come, even though there has been no specific direction by the Supreme Court or the federal Government on what leases are affected," she said.

The four oil companies originally received their leases from the State of Louisiana. Their payment to the federal Government, instead of the state, is apparently based on the Supreme Court decision that the federal Government has paramount rights to the tidelands.

Louisiana was notified of the payment in a letter from Continental Oil Co. Continental was representing itself and three other firms—Atlantic Refining Co., Cities Service Oil Co., and Tide Water Associated Oil Co.—which hold joint leases.

TECHNOLOGY

A.S.M.E. Study

Group discusses orifice metering, austenitic steels, synthetic lubricants, at seventy-first annual meeting

George Weber

NEW YORK.—Petroleum engineers attending the seventy-first annual meeting of the American Society of Mechanical Engineers here last week directed their attention to orifice metering, austenitic steels, pipe-thickness formulas, bolted-flanged connections, and the properties and performance of two new classes of synthetic lubricants. Earlier in the week, a symposium surveyed the corrosion difficulties encountered in high-temperature operations using residual fuels with vanadium oxide content *(The Oil and Gas Journal, November 30, 1950, page 48)*.

The "Precision and Accuracy of Orifice Meter Installations," a report by L. V. Cunningham, Jr., mechanical engineer with Esso Standard Oil Co., Baton Rouge, La., summarized the results obtained from a 4-year study of dual metering of liquid C_4 streams by identical orifice meters. Cunningham reported that data from 2,544 sets of meter charts indicated that the two meters agreed within 1 per cent, 85 per cent of the time. Further, comparison of the quantity indicated by such meters, with that indicated by gages on water-calibrated receiving drums showed an agreement of 99.0 per cent for over 60 per cent of the time, and an average agreement of 99.3 per cent over an approximate 2-year period.

He concluded in general, that orifice meters of the type used are satisfactory for measuring liquid-hydrocarbon streams, that precision can be maintained over long periods of time with proper maintenance, and that in the case of one stream so measured, that the dual orifice meters were more precise than receiving-drum gaging.

Discharge.—The discharge characteristics of orifices at low-pressure ratios were investigated by R. G. Cunningham, research engineer, Pure Oil Co., Chicago, who reported on "Orifice Meters With Supercritical Compressible Flow." He concluded that the use of the expansion-factor type of flow equation and the convenient linearity of the Y-r (i.e. the expansion factor vs. pressure ratio) correlation should facilitate the metering of compressible fluids at supercritical pressure ratios with an accuracy comparable to that in the usual metering range.

Austenitic steels.—Because of the recent interest of petroleum engineers in the use of austenitic steels for high-temperature service, M. E. Holmberg, of Phillips Petroleum Co., Bartlesville, Okla., reported on the service experience and inspection results of such steels used by his company in refining operations.

Other high-temperature properties than the basic ones of strength, creep, and stress rupture, were discussed by Holmberg, who concluded that: "(1) Stabilized austenitic steels are not required for gas-cracking and still tubes; (2) a spheroidizing heat-treatment is adequate for many oil-industry applications requiring austenitic steels in the stabilized condition; (3) stress relieving austenitic steels can seldom be justified unless stress-corrosion cracking is known to occur; (4) the hot-shot characteristics of austenitic steels should be considered in high-temperature design; and (5) the low thermal conductivity and high coefficient of expansion are responsible for many of the failures of austenitic steels in high-temperature service, especially where thermal shock and thermal fatigue are involved."

Synthetic lubricants.—Two types of synthetic lubricants were discussed in comparison with petroleum-derived lubes. Silicone lubricants were reported by two engineers with Dow Corning Corp. to show exceptional resistance to heat and to many corrosive materials. In addition, these new fluids and greases are reported to show little change in physical characteristics over a wide temperature range, and long service life in antifriction bearings at high speeds from —100° F. to +375° F. They are most useful when substituted for organic oils and greases which stiffen at low temperatures, break-down in corrosive atmospheres and bleed, evaporate or form gums at high temperatures. Their load-carrying capacity may be limited or excellent depending on the bearing metal combinations.

The polyalkylene glycols and their derivatives, representing another type of synthetic lubricant, were reported as differing considerably from petroleum products in physical and chemical properties. On the basis of comparative engine tests, two Union Carbide & Carbon Corp. authors rated the new-type lubricant superior to premium grade motor oil as regards ring sticking, cleanliness, overhaul, and lube-change intervals and lube makeup, reporting wear on fittings, cylinders, and bearings as normal for both oils.

Other factors.—Price and availability, two other factors in which these synthetic oils differ considerably from petroleum lubricants, were not discussed by authors of either paper.

W. J. Buxton and W. R. Burrows of Standard Oil Co. (Ind.) reviewed formulas for pipe thickness, pointing to the need for additional pure shear experimental data on creep and on stress rupture. Reporting on the "Effect of Internal Pressure on Stresses and Strains in Bolted-Flanged Connections," D. B. Wesstrom and S. E. Bergh, design engineers with E. I. du Pont de Nemours & Co., Inc., adding the hope that a more realistic approach to flange design in the rules of the A.S.M.E. code might be found, if such is possible within the framework of the code.

Petroleum coke.—A motion picture illustrating the burning of petroleum coke on spreader stokers was presented, along with an informal discussion on the subject by Otto de Lorenzi, of Combustion Engineering-Superheater, Inc., New York. On the basis of test operations in a boiler plant in the Chicago area, de Lorenzi reported the conclusion that there is a definite place for petroleum coke in this field of use, provided the price is com-

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petitive with coal coke. While no commercial operations of this type are known at this time it is felt that solution of some problems which petroleum-coke characteristics present, is probable, and that its use in such areas as the Pacific Coast is likely. Maintenance of low grate temperatures in using the low ash-content fuel is one problem. Another is the corrosion which will attend the burning of coke containing vanadium pentoxide. The speaker had no data on vanadium content of various petroleum cokes, but pointed to the possibility that vanadium might be economically recovered from the ash in such operations.

ROCKY MOUNTAIN

Expanding Oil Area

Rockies increasing in importance, Porter says

DENVER.—The Rocky Mountain area is becoming an oil center which is rapidly increasing in importance, Frank M. Porter, president, American Petroleum Institute, told members of the Rocky Mountain Oil and Gas Association at its sixth annual convention here last week.

Petroleum, he said, ranks first among the mineral products of Colorado and Wyoming, the second among the mineral products of Montana. With its increased importance as an oil-producing area, it is incumbent upon the industry to tell its story to the people of this vast area, to correct false impressions that people have about the industry and those working within it.

Porter said that the oil industry during World War II "performed almost superhuman feats" of oil production, refining, and transportation, and by so doing received loud and melodious praises for its achievement.

With the then thought-to-be peaceful settlement of World War II, however, the industry found itself the target of every kind of unfair attack and abuse.

He said that on many occasions the industry made no effort to answer these false charges, believing them to be so incredible that reply was unnecessary.

Porter touched on many of the congressional attacks against the industry and the misinformation that has been widely spread about it, and cited the need for greater participation by all oil men in the public-information program.

Shale oil.—He said the entire industry is watching the "highly significant" shale-oil experiments which are now being carried out by the Bureau of Mines in Colorado.

"All observers are impressed by the dynamic rise of the Rocky Mountain region as an oil-producing center," he said.

J. Ed Warren, president of the Independent Petroleum Association of America, in speaking before the group, said that given adequate materials, an equitable tax base, and assurance of operating in a free economy, the oil industry will meet all requirements of the national defense program.

Valuable results.—He said that the short "breathing spell" the industry has had, free from government controls, since World War II "has produced results so valuable that the perennial petroleum pessimists have almost been silenced."

He said that oil-industry performance since the last war has taught us "a lesson that we must try to keep uppermost in the minds of all who have responsibility in directing the national economy in the present emergency: that results which we can show in the form of greater reserves of petroleum and increased availability came about under a free economy."

Conservation.—All phases of conservation were taken into consideration by the more than 300 members of the association. Preliminary outlines for the panel discussion, based on study over the past year, were presented by A. F. Barrett, General Petroleum Corp., Casper, head of a committee appointed by Glenn E. Nielson, association president.

Also discussed was the use of conservation laws throughout other oil states, plus application to needs of Rocky Mountain states. Conservation and proration measures have been studied by the association for several years, and bills, not backed by the association, have been presented unsuccessfully to each Wyoming legislature for more than 10 years. The group heard from outstanding industry representatives both for and against the plan under consideration, before returning it for further committee study and possible action by the executive committee.

Emphasis of activity for R.M.O.G.A. during the past year, under direction of William (Scotty) Jack, executive vice president, has been on public relations throughout the Rocky Mountain states, and Harrison Brewer, associate editor of the Casper Tribune-Herald, analyzed this program and the industry's need for it.

Officers named.—Charles S. Hill, Denver independent oil man, was elected president of the association at its closing session. Glen E. Nielson, Husky Oil Co., Cody, Wyo., was retiring president who served a 2-year term. Gilbert J. Mueller, Argo Oil Co., Denver; J. P. Moroney, Sinclair Oil & Gas Co., Denver; and Zack K. Brinkerhoff, Jr., Brinkerhoff Drilling Co., Casper, were elected vice presidents; and Walter Davis, independent, Casper, was named treasurer.

The association passed resolutions thanking Oscar Chapman, Secretary of the Interior, for his understanding and appreciation of the efforts of the oil and gas industry toward conservation, and opposed competitive bidding for federal oil and gas leases on lands not known to be valuable for oil and gas. A resolution was also passed requesting amendment to the Federal Leasing Act so that there be no limitation to the number of acres any lessee may acquire by lease or assignment for oil or gas mining purposes. At present there are limitations as to holdings on both Indian and federal lands in the public domain states.

CANADA

Line-Route Change Sought

TORONTO.—West Coast Transmission Co., which will construct and operate a pipe line out of Alberta, has asked permission of the Canadian Board of Transport Commissioners to reroute its proposed line 250 miles to the north of the original designation.

The company now asks authority to construct its line through Pine Pass, crossing the Rocky Mountains 250 miles north of Yellowhead Pass as previously intended. The new application seeks location of the pipeline route from Alberta's Pouce Coupe field to Dawson Creek, B. C.; then on to a point near Vancouver. A branch line would be laid from near Abbotsford, B. C., to a point on the international boundary near Huntington, B. C.; and another branch from Princeton, B. C., to a point on the boundary near Osoyoos, B. C.

In its original application, the company proposed to follow the route of the Canadian National Railways through Yellowhead Pass, running from Edmonton to Vancouver, with a branch from Tete Jaune Cache, B. C., to Dawson Creek. Permission already has been granted for the company to construct a pipe line from the Pouce Coupe field to Dawson Creek. The new application calls for an extension of that short line.

Products Line Considered

SARNIA, Ont.—Officials of Imperial Oil have disclosed that the company is considering a products pipe line from Sarnia to outlets in Hamilton and Toronto. A final decision on the project cannot be made until plans have been completed in full detail and the cost assessed. If costs are high in comparison with the present system of supply, the project will not be carried through.

50 YEAR report to our customers -

FROM DATE OF INCORPORATION ON NOVEMBER 23, 1900 TO DECEMBER 31, 1949

THE COMPANY RECEIVED:			
From customers for products purchased by them		$5,122,702,261	
Dividends received, interest earned, and other income		76,068,236	
Total revenues		$5,198,770,497	
THE COMPANY PAID OUT OR PROVIDED:			
For raw materials, supplies, and services bought	$2,766,354,971		
Provision for depreciation (wear and tear or obsolescence) of plants, buildings, machinery and equipment and for depletion of coal, iron ore and limestone, etc., by mining operations	270,852,769		
Federal, State, local and miscellaneous taxes	267,462,953		
Interest and other costs on long-term debt (including dividends of $27,265,805 paid to preferred shareholders)	117,724,128		
Total costs		3,422,394,821	
Leaving for wages and salaries of employees, dividends to shareholders, and amount required to be retained by company for needs of the business		*$1,776,375,676	100.00%
***OUT OF WHICH THERE WAS PAID:**			
Employment costs (pay rolls, vacations, social security taxes, insurance and pensions paid to or for account of employees)		$1,474,693,687	83.02%
To common shareholders as dividends		125,126,950	7.04
Amount retained in the business for present and future needs and to assure steady work for employees		176,555,039	9.94
Total		$1,776,375,676	100.00%

Your patronage and the American system of free enterprise have helped make this company an important factor in the steel industry. Our future depends on keeping America free, so that any group of citizens may organize a business, at any time--with the expectation that it, too, may grow strong--provide jobs, supply needed products and achieve success in the next 50 years. In the preservation of the American way of life lies our future hope.

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XUM

Slush Pump Valve Inserts by American Iron and Machine Works Co.

Rubber Parts by Murray Rubber Co., Houston, Texas

How HYCAR tames the mud that bites

IN drilling for oil, the fluid that lubricates the bit as it whirls at the bottom of the hole is known as "mud". This fluid is always abrasive, more so as it circulates back to the surface loaded with cuttings and sand.

Mud is circulated by a reciprocating-type slush pump, shown in the picture, and it is right here that Hycar does a great job. The valve seat inserts, a vital part of the pump, are made of Hycar. As the mud goes round and round, Hycar meets every challenge of tough operating conditions.

Drilling operations are carried on at high pressures, 800 to 900 pounds. When pumps are doubled up, as high as 2500 to 3000 pounds. So the Hycar valve seat inserts must be able to stand high velocities as well as the "biting" action of the mud at normal pressures.

Often gas and oil from the drilling contaminate the fluid. Here, again, Hycar performs. For not only is Hycar gas-and-oil-resistant, it is unaffected when chemicals such as caustic soda are added to the mud. Through all drilling operations, Hycar retains its strength and toughness.

Hycar
Reg. U. S. Pat. Off.
American Rubber

When drilling operations stop and the pumps are stacked, Hycar "sits it out" without deteriorating. The Hycar compound used will not stick to its steel core or the valve seat.

What Hycar does for this specialized use may start an idea on its profit-making way for you. For Hycar is used as a base material for many products . . . as a plasticizer for polyvinyl resins . . . as a modifier for phenolic resins . . . as an adhesive base . . . as a latex for coating or impregnating. We'll gladly help you with technical advice and bulletins. Just write Dept. HE-13, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio. In Canada: Kitchener, Ontario.

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Middle East Postings

First public posting of export prices for Arabian, Qatar, and Iraq crudes announced by Socony-Vacuum

Dahl M. Duff

THE first public posting of export prices for Middle East crude was made last week when Socony-Vacuum Oil Co., Inc., issued a schedule showing quotations for Arabian, Qatar, and Iraq oil.

Socony-Vacuum's posting listed $1.75 a barrel for Arabian crude of 36°-36.9°-gravity, f.o.b. Ras Tanura, Saudi Arabia; $1.77 for Qatar crude of 37°-37.9°-gravity, f.o.b. Umm Said in Qatar; and $2.41 for Iraq crude of 36°-36.9°-gravity, f.o.b. Tripoli, Lebanon.

These export prices have been well known within the trade and represent no change from the level that has prevailed over the last year except that the Iraq price has varied according to tanker rates. Socony-Vacuum's action in making a public posting and announcing it would continue to do so as changes occur placed its prices on record and had the advantages of more orderly and open price information.

At the same time last week, there was considerable interest in the industry and at the Economic Cooperation Administration over what export prices will be charged for crude lifted at the Sidon, Lebanon, Eastern Mediterranean terminal of the newly opened Trans-Arabian Pipe Line system.

Caltex price.—It was disclosed that the price at Sidon by California-Texas Oil Co., Ltd., will be $2.45.

Over the weekend, Standard Oil Co. (N.J.) and Socony-Vacuum, the other two partners in the pipe line, were disclosed to have notified ECA that their crude prices at Sidon will be the same as at Tripoli. Esso Export, Jersey Standard's sales affiliate, effective December 1 listed a $2.55 price for crude at Tripoli, but the company was considering reducing this for Sidon in view of the lower price level of the other two companies.

Although the ECA was reported to be looking into the question, it was pointed out that any other plan at the present time could be chaotic. Different laid-down prices in Europe could hardly be charged for crude delivered through the line and brought from tanker from the Persian Gulf. A lower laid-down price for crude from Sidon could be immediately netted back to lower the basic Persian Gulf price.

Benefits.—Some responsible officials feel that whatever benefits there are in pipe-line transportation across the Arabian Peninsula will be passed on to the consumers only after the completion of the pipe lines to the Eastern Mediterranean makes this area the primary point of shipment for Middle East crude to Europe.

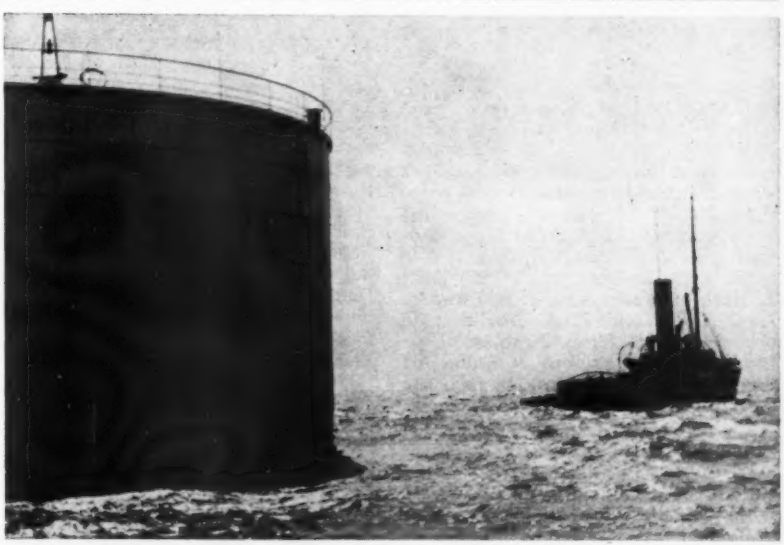
While Tapline carries at full capacity 300,000 bbl. daily, the primary point of shipment will continue to be the Persian Gulf until the Iraq Petroleum Co., Ltd., 30-32-in. from Kirkuk and the 34-36-in. Middle East Pipelines, Ltd., project from Iran and Kuwait are completed. When all three lines are completed in 4 or 5 years, they will carry well over half the anticipated crude exported from the Middle East.

Based on flat U.S.M.C. (U. S. Maritime Commission) rates, the differential to western Europe for shipments from the Persian Gulf and from the Tripoli-Sidon-Haifa area is 70 cents a barrel. There have been unofficial estimates of the cost of moving oil through Tapline, varying according to the exact period of the necessarily short amortization of the $230,000,000 plus cost of the project.

The fact that spot tanker rates, and to a lesser extent time-charter rates, fluctuate widely complicates the Eastern Mediterranean crude pricing. The companies presently concerned are using slightly different formulas of figuring rates and thus arrive at the Eastern Mediterranean price.

Differential.—Socony-Vacuum's posted $2.41 price for Iraq crude at Tripoli, reportedly based on long-term time charter rates, represents a differential of 66 cents over the Persian Gulf price. Jersey Standard's reported $2.53 price for Iraq crude at Tripoli shows a differential of 78 cents.

The entire matter of Eastern Mediterranean crude prices at present is one of the use of accepted delivered-pricing principles, and it is felt that competition will force the Sidon-Lebanon prices to a common level in the range now existing. Sales to subsidiaries must be billed at the lowest available price because of



Tanks Take to Sea

Transportation of oil-storage tanks by water is not new, but their movement across 75 miles of open sea is as far as is known a unique operation. This was accomplished recently when the Danish member of Shell Group moved four tanks, three of 17,500-bbl. capacity and one of 3,800 bbl., from Korsor to Fredericia. The bottoms were reinforced by steel joists, and after being floated into the water on a special slipway, the tanks were towed one at a time across the Southern Kattegat. Time taken for each trip was 16 to 20 hours. The three larger tanks weighed 80 tons each, and the small one, 20 tons. A/S Dansk Shell is expanding its ocean terminal at Fredericia by the construction of additional storage and a jetty for tankers up to 18,000 tons. At the same time, the company is enlarging its chief ocean terminal at Copenhagen. Both projects are scheduled for completion in the spring of 1951.

minority interests, government regulation, and other factors.

The feeling in trade circles is that the ECA will approach the Eastern Mediterranean crude-pricing matter with a certain caution. Its action several months ago in ruling an arbitrary flat reduction in the price of products delivered from the Middle East into the Eastern Mediterranean resulted in a situation where major suppliers, British and American, failed to quote in the area.

Another posting.—Socony-Vacuum in the near future is expected to add an f.o.b. Sidon posting to those already announced. Its last week's posting of the three prices followed in general the method used by crude producers in the Southwest. A 2-cent per degree of gravity differential was noted, and the prices were listed as exclusive of local port or other government charges and sales taxes.

Socony-Vacuum holds a 10 per cent interest in Arabian American Oil Co., and the Trans-Arabian Pipe Line project, a 11⅞ per cent interest in Iraq Petroleum which also produces in Qatar, and a 14.4 per cent interest in Middle East Pipelines, Ltd. Largest of the interest holders in Aramco and Tapline is the Caltex organization which represents the Standard Oil Co. of California and The Texas Co. interests of 30 per cent each.

Tapline Begins Operation

The Trans-Arabian pipe-line system has gone into commercial operation with the first shipments of crude oil from the terminal at Sidon, Lebanon.

Loadings were started December 2 when four tankers took aboard more than 700,000 bbl. of oil which had been pumped 1,068 miles from producing fields in Saudi Arabia.

W. S. S. Rodgers, chairman; Burt E. Hull, president; and B. B. Howard, A. C. Long, and F. A. Davies, vice presidents of Trans-Arabian Pipe Line Co., were present at Sidon for the first loadings. Hull turned the control valve starting the flow of crude from the tank farm into the submarine loading lines.

W. F. Moore, president of Arabian American Oil Co., said in New York that completion of Tapline in effect moves Aramco crude more than 3,000 miles closer to European markets. As a result, Arabian oil has been placed in a position where it can be on a competitive footing with crudes from South America or any other world sources of supply.

Deliveries at Sidon mark final completion of the largest single undertaking ever carried out by private American capital outside the United States. The entire system cost more than $230,000,000. At full capacity it will deliver 300,000 bbl. daily to Sidon, using initial aggregate of 76,130 bhp. of the six pump stations.

Aramco Field

Ain Dar, found in 1948, to be brought in next year

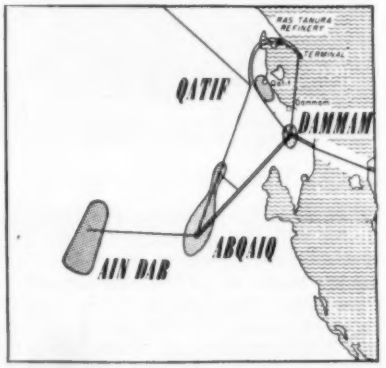
A FOURTH oil field will be brought into commercial production shortly after the first of the year by Arabian American Oil Co.

The field is Ain Dar, located about 30 miles west of Abqaiq and about 55 miles from the shore of the Persian Gulf. There are now 11 completed oil wells, and construction of the field separator facilities and a connecting pipe line to Abqaiq is nearly complete.

The rate at which the field will be produced initially has not yet been determined, since only short tests have been made of the wells. The production from Ain Dar will be used to supplement Abqaiq which with its current output of about 550,000 bbl. daily is the world's largest producing field *(The Oil and Gas Journal, August 3, page 42)*.

The 30-mile connecting line is 20, 22, and 24-in. in diameter and has a maximum capacity of 300,000 bbl. daily. The separator station nearing completion is No. 1, located near the center of the field. No. 2 station near the north end of the field is scheduled for completion about the middle of next year; No. 3 at the south end is due to be finished late next year. All three stations are of 100,000 bbl. daily capacity, using horizontal separation at 250 and 50 psi., and spheroid at 5 psi.

More production.—Commencement of commercial production at Ain Dar will add substantially to the company's productive potential and allow output to be distributed between this field, Abqaiq, and two other smaller fields. Besides Abqaiq, Aramco now obtains about 95,000 bbl. daily from Dammam, its first field discovered in 1938, and about 10,000 bbl. daily from Qatif, which was discovered in 1945.



This sketch shows the location of Arabian American Oil Co.'s producing fields and connecting pipe lines, including that now under construction between Ain Dar and Abqaiq.

To accelerate development of Ain Dar field, Aramco is planning the addition of two additional rigs shortly after the first of the year. The company now has five rigs running, two of these in Ain Dar.

In this expanded drilling program, four rigs will be used in Ain Dar, three National 100's and one National 75. Three will be employed on field locations, and the third on extensions to the south where the field is still not completely defined.

Found in 1948.—Ain Dar was discovered in 1948. Production comes from the Arab limestone of the Jurassic at about 6,000 ft. Gravity of the Ain Dar is 2° to 3° below that obtained from Abqaiq. Wells 1 to 7, 9, 10, 12, and 13 have been completed as producers. No. 8 is a water observation well, and Nos. 11 and 14 are those currently drilling. Drilling time in Ain Dar is 6 weeks to 2 months.

About 50,000 ft. of gathering line, mostly 6-in., is being laid from the now completed wells into Station 1 to allow the field to go on commercial production. Gas-turbine driven pumps will be installed at each of the three stations.

At Abqaiq, the line from Ain Dar enters the tank-farm and stabilizer-plant area. Here, the company's recently completed stabilizer plant has a capacity of some 350,000 bbl. daily capacity. From this point, crude is moved by a system of lines to the several terminals, including Ras Tanura and Qaisumah. The latter station is the origin point of the Trans-Arabian Pipe Line Co. 30-31-in. main line which extends on to the Eastern Mediterranean terminal at Sidon.

Kuwait Crude Contract

Atlantic Refining Co. has recently concluded a long-term contract with Gulf Oil Corp. for the purchase of Kuwait crude, according to Henderson Supplee, Jr., Atlantic executive vice president.

Under the contract, Atlantic will obtain 12,000 bbl. daily of the Middle East crude over a 5-year period. First shipments are scheduled to be made around the first of the year.

The three supertankers of approximately 30,000 dwt. each which Atlantic has recently built will be used to transport the Kuwait crude to the company's 117,500-bbl. daily refinery at Philadelphia. The Kuwait concession is owned equally by Gulf and Anglo-Iranian Oil Co., Ltd. Gulf also disposes of a large part of its share of the production to Royal Dutch-Shell.

This and other aspects of Atlantic's operations were discussed by Supplee at a meeting in New York of the Society of Security Analysts.

Atlantic has no plans, he said, for entering active operations in the Middle East.

Bulk shipping keeps pace with chemical progress

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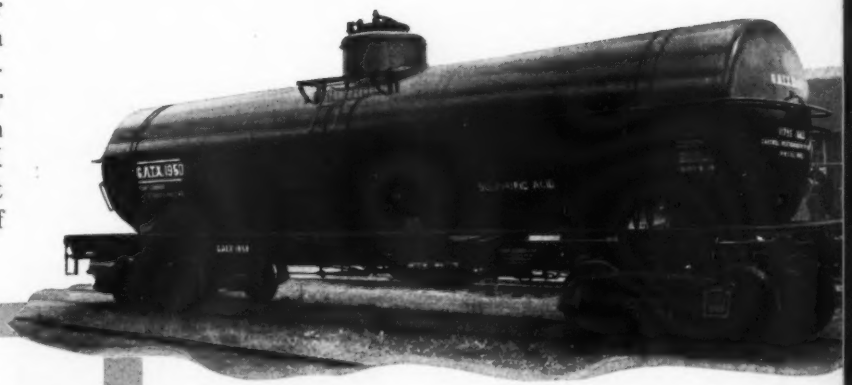
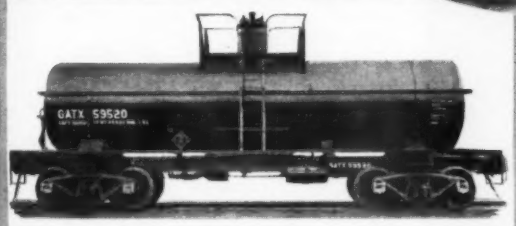
today GATX-Built Sulphuric Acid cars carry up to 11,800 gallons!

General American now makes it possible to ship up to 11,800 gallons of sulphuric acid in a single tank car. These cars are a result of the GATX program of continuous research and development for the chemical industries, through which GATX makes similar shipping economies possible for your other commodities also. More than 200 types of specialized GATX tank cars supply safe, low-cost transportation for shipments of bulk liquids.



This modern 11,800-gallon GATX sulphuric acid car is one of the largest now in service.



Shipments of smaller quantities of sulphuric acid are made economically in 7000-gallon GATX cars.

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Bulk shipping keeps pace with chemical progress

XUM

French Refinery Quotas

Quantities of domestically refined lubes, motor fuel that can be sold on French market set by government

THE French Government has issued new long-term quotas for individual French refineries, fixing the quantities of domestically refined lubricants and motor fuel that can be sold on the metropolitan French market.

The allocations set the future pattern of French refining and are in effect a control on crude-oil imports. Other strictly marketing quotas are issued to refiners and other distributors, to include not only the allowed refinery production but also product imports.

The newly announced allocations apply to the total of gasoline and lubricants that can be produced in French refineries for sale in France. Products sold to the French military, to industries for synthetic chemical use, shipped in export or to French overseas territories, can be made outside the quotas. Nor is production of products other than motor fuel and lubricants included under the refining French market allocations.

It is reported that most of the French refineries have been given about the same percentage increases under the new allocations except for Cie. Francaise de Raffinage, the partially French Government-controlled refining company, which was allowed a greater expansion. The new allocations are valid until December 31, 1964, compared to the last allocations issued in April 1931.

Other developments.—Other recent developments in the French refining industry:

Three of the four American companies supplying dollar crude oil from the Middle East to the French refineries have signed agreements with the finance minister to accept 75 per cent payment in dollars and 25 per cent in French francs or other European currencies, depending on France's balance of payments.

This acceptance by the American companies of partial payment in local currencies reflects measures adopted to meet the dollar shortage abroad. Although the currency position of most European countries have improved in recent months, governments have been striving to reduce the dollar outlay on the oil account. The use of sterling and other foreign currencies by American companies operating abroad has resulted in linking American foreign operations more closely to foreign supply sources.

The three companies involved in the French agreements are reported to be California-Texas Oil Co., Ltd., the Standard Oil Co. (N. J.) organization, and Gulf. Socony-Vacuum Oil Co., Inc., the fourth American company, is understood to be negotiating with the French Government for a solution of its own problem along similar lines.

Crude runs.—It was announced in Paris that crude runs to stills of French refineries in August rose to an all-time record averaging 310,000 bbl. daily. This is equivalent to approximately 15,500,000 tons a year. The French refining industry, which was substantial even before the war, continues to be the leading one in Europe, though it will be ultimately slightly exceeded in total capacity by that now building in Britain.

The French Petroleum Organization said in Paris that French refining capacity is expected to reach 18,700,000 tons (about 374,000 bbl. daily) by 1953 compared with 11,528,000 tons in 1949 and 8,000,000 tons in 1938. The association also said the French tanker fleet will consist of 61 vessels totaling more than 1,000,000 tons in 1953 compared with 709,000 tons last January and a prewar fleet of 400,000 tons.

The postwar shift of European refineries from the Caribbean and Gulf Coast to the Middle East for crude supply has been particularly noteworthy in France. At present, 81.5 per cent of the charge for French plants is coming from the Middle East. Only French-owned source of production in the Middle East is the 23.75 per cent share of Iraq Petroleum Co., Ltd. French officials expect that the expansion of Iraq production will allow the country to cover 40 per cent of its total crude needs from I.P.C. by 1953.

In connection with the new motor-fuel and lubricant quotas setting what can be produced by French refineries and sold on the domestic market, an agreement between the government and Cie. Francaise des Petroles allows this French company to import crude oil outside the quotas corresponding to 25 per cent of the total annual output of finished products delivered to consumers. C.F.P. holds the French share in Iraq Petroleum and controls the French refining company, Cie. Francaise de Raffinage.

Refinery quotas.—Individual French refining quotas on an annual basis follows:

Soc. General des Huiles de Petrole: 327,000 tons of motor fuel and 55,000 tons of heavy oils, basic lubricants, and similar products.

Socony-Vacuum Francaise: 169,000 tons of motor fuel and 37,000 tons of heavy oils and lubricants based on oil.

Standard Francaise des Petroles: 420 tons of motor fuel and 139 tons of heavy oil and lubricants based on oil.

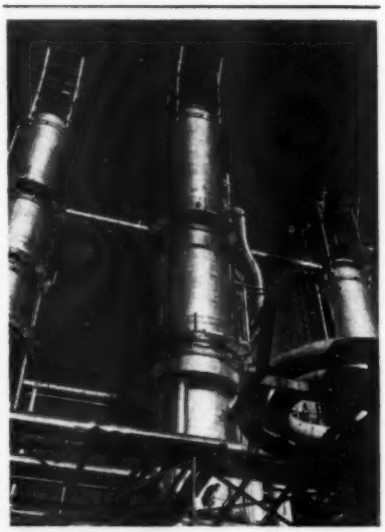
Raffineries Francaises de Petrole de l'Atlantique: 295,000 tons of motor fuel and 38,000 tons of heavy oils and lubricants.

Raffineries de Petrole de la Gironde: 145,000 tons of motor fuel.

Cie. de Produits Chimiques et Raffineries de Berre: 187,000 tons of motor fuel and 30,000 tons of heavy oils and lubricants.

Soc. Shell Francaise: 310,000 tons of motor fuel and 45,000 tons of heavy oils and lubricants.

Cie. Francaise de Raffinage: 468,000 tons of motor fuel and 40,000 tons of heavy oils and lubricants.



Shell Vacuum Columns

The new refining facilities built by Shell Refining & Marketing Co., Ltd., at Shell Haven, Essex, England, came on stream in mid-November, 6 weeks ahead of schedule. The new plant is now producing about 30,000 bbl. daily of products. The full refinery scheduled for completion by 1952 will have a capacity of more than 2,000,000 tons a year. The photo shows three vacuum columns at the refinery.

Russian Oil Output

WASHINGTON.—Russian oil production is now running better than 20 per cent above prewar output, it was reported last week by the Soviet Embassy here.

Although the latest 5-year plan called for expansion of production this year to 14 per cent above prewar, it actually reached a figure of 21 per cent in the first 10 months, according to figures given the Moscow Soviet last month by Marshal N. A. Bulganin.

In his address, released through the embassy's information bulletin, Bulganin disclosed in a general way the

areas in which new oil reserves have been developed.

"The oil industries of Maikop and Grozny and of the Western Ukraine, destroyed during the war, have now been fully restored and technically re-equipped," Bulganin said.

He reported that new oil regions in the east have acquired greatly enhanced importance; big new fields have been opened up, and new refineries built in Bashkiria. He also cited activities in the Turkmen, Uzbek, and Kazakh republics, and told of extensive development work now under way on Sakhalin Island.

The oil-refining industry has been technically reequipped. Output of equipment for the oil industry, he said, will be more than three times the prewar production.

LATIN AMERICA

Pemex Discoveries

Three oil areas opened in Mexico during October

EXPLORATORY activities supervised by Petroleos Mexicanos resulted in the discovery of three important new oil areas and encouraging prospects in a fourth in October, it was announced by Sen. Antonio J. Bermudez, director general of the company, through Pemex's Washington office.

Bermudez listed the month's developments as an extension to the El Plan field in Vera Cruz; a wildcat discovery in Tancoco, Vera Cruz; a prolific new horizon in the Monterrey field, Tamaulipas; and a potential wildcat oil producer near Tuxpam, Vera Cruz.

"The discovery of new production at El Plan is of great importance," Bermudez said, "not only because it signifies a new source, heretofore unknown, but because of the substantial immediate increase in the productivity of the Isthmus area which the three wells have accomplished."

Detailing the discoveries, Pemex said the west flank of the salt dome in the El Plan field was tested successively between 4,990-6,980 ft. to open up a large new area for exploration. Wells 196, 198, and 199, approximately 1 mile from the previously known production, were completed as flowing producers with an initial production of 371, 1,069, and 2,096 bbl. daily, respectively. Pressures indicated a virgin zone and satisfactory sand thicknesses prove a new pool which add substantial reserves to the field, which is in the southernmost part of Vera Cruz contiguous to the boundary of the state of Tabasco.

"Golden Lane."—In Tancoco, a wildcat drilled on surface gological information 6 miles west of South Amatlan in the Golden Lane found commercial production at the lower contact of an igneous intrusion within the Guayabal formation. The well was completed as a flowing producer for 315 bbl. per day at 3,463 ft. and although this production is important it is believed that a more prolific production is assured from the Tamabra limestone, anticipated at 6,000 ft. Also, this discovery when compared to the Moralillo field 5 miles southward suggests that a group of new producing areas may be found along a trend parallel to the prolific Golden Lane. Further exploratory drilling is planned to test this possibility.

Monterrey field.—Monterrey 3, in the Monterrey field 9 miles southwest of the Reynosa field, was completed flowing 315 bbl. per day from Frio sands at 6,400 ft. Prior to this completion, Monterrey 1, the discovery well, was completed for 1,412,000 cu. ft. of gas per day, and Monterrey 2 for 54 bbl. of oil per day from different horizons. The discovery of large oil production in well 3 enlarges the potential oil prospects in this field as well as in all of the other structures in northeastern Mexico, it was claimed.

Testing under way.—About 2½ miles northeast of Tuxpam, Vera Cruz, an attractive seismic anticlinal structure is now being tested by the drill with very encouraging results. The objective of this well is to test the Middle Cretaceous limestone which is the principal producing horizon in the Tampico embayment. However, between 4,230-80 ft., in the San Felipe formation of Upper Cretaceous age, and probably some 100 ft. above the objective zone, evidence of live oil and gas has been found in fractures of dense limestone. Although this good showing of oil and gas is not indicative of commercial production in the Upper Cretaceous, the potentiality of the deeper zone is greatly enhanced, Pemex said.

Creole Production Up

Creole Petroleum Corp.'s operated production rose to a new peak of 672,428 bbl. daily in September, and drilling activity by the company increased to its highest level since last January.

The company's operated production represented a 23,175 bbl. daily gain over August and was slightly in excess of last June's record of 671,703 bbl. daily. Of the September output, 518,412 bbl. daily came from Lake Maracaibo, 3,503 bbl. daily from Cumarebo and Mara, and 150,513 bbl. daily from Eastern Venezuela. The company's total net production plus purchased royalty oil in September was 707,700 bbl. daily.

Average number of rigs in operation by the company during September was 8.6 compared to 6.7 in August and 9.8 in January. Ten wells were completed during the month, all producers. Of these two were exploration wells. One was in Maracaibo field with an initial production of 1,512 bbl. daily and a total depth of 5,698 ft. The other was the company's Alturitas wildcat on the west side of Lake Maracaibo which was completed for an initial production of 1,200 bbl. daily. This well, deepest ever drilled outside the United States, went to 17,039 ft.

Refinery runs by the company in September totaled 126,915 bbl. daily. A daily average of 64,085 bbl. and 62,830 bbl. was refined at Caripito and Amuay respectively during the month.

INTERNATIONAL NUMBER

The Journal's annual International Number, which will appear December 21, will feature petroleum developments throughout the world. Also included will be a comprehensive article on Russian oil production; a survey of all the oil fields, refineries, and pipe lines serving the industry exclusive of the United States; and an engineering section on modern practices in foreign operations.

"Steep Inch" to Operate

The so-called Steep Inch products pipe line from the coast inland to Caracas, Venezuela's capital, is scheduled to go in operation early this month.

Actual welding of the line was completed in August, and final testing will take place as soon as the pump station at Catia de la Mar, its origin point on the coast, is completed. The line has been built by Creole Petroleum Corp. and Shell Caribbean Petroleum Co., leading marketers in Caracas.

Although the line is slightly less than 10 miles in length, it crosses extremely mountainous country and in some places the grade is as much as 45 per cent. Shell is using its existing terminal at Catia de la Mar storage for about 95,000 bbl. as well as facilities in Caracas for storing an additional 53,500 bbl. Creole has built a new Catia de la Mar terminal to receive products from offshore tankers and has constructed other storage facilities in Caracas. Capacity of the Creole installations at these two points are 194,500 bbl. and 87,500 bbl. respectively.

The line has a capacity to pump products at the following per hour rates: gasoline, 1,500 bbl.; kerosine, 1,200 bbl.; and diesel, 1,000 bbl. Its construction was handled by Macco Pan Pacific.

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Vice President

Dawson, veteran refiner, is with Carthage Hydrocol

FRANK M. DAWSON, vice president of Carthage Hydrocol, Inc., with offices in New York City, is a veteran refiner, having begun his career with The Texas Co. following graduation from Rice Institute, Houston, in 1928.

For the past 4 years he has been occupied with the building of the Carthage Hydrocol organization, and construction of the Carthage synthetic-gasoline and chemicals plant at Brownsville, Tex.

Dawson held various positions with Texaco in Texas, New York, and Illinois from 1928 to 1946. For 3 years he served as superintendent of Texas - Socony - Vacuum's Ultramar refinery in Argentina, and was serving as superintendent of Texaco's refinery in Lawrenceville, Ill., prior to his election as vice president of Carthage in 1946.

The Brownsville plant has been completed, at a cost of approximately $40,000,000, and will produce gasoline from natural gas.

Dr. Chester Stock, chairman of the division of geological sciences, and professor of paleontology at California Institute of Technology, has been elected president of the Geological Society of America.

Thomas Pennington, Jr., marine-equipment engineer of the marine-equipment division, Humble Oil & Refining Co., Houston, has been transferred to the petroleum-engineering division as senior supervising petroleum engineer. **Fred W. Stover,** compressor - plant foreman, Seeligson, Tex., has been transferred to the Clear Lake, Tex., gasoline plant as superintendent, and **J. W. Workman,** assistant cycling-plant superintendent, Katy, Tex., has been transferred to the Trawick gas system as district gas superintendent.

Don West, of the geophysical department of Socony-Vacuum Oil Co., Inc., has returned to the New York office after a 6-month assignment in Venezuela studying subsurface problems. **Roland Garwood** has been sent from the company's New York office to engage in a similar study.

N. Dean Altemus, petroleum engineer for Stanolind Oil & Gas Co., has been transferred from Powell, Wyo., to Pampa, Tex.

Nicholas D. Papaccio and **Robert Vibbert** have been named foremen at Tide Water Associated Oil Co.'s Bayonne, N. J., refinery.

Dr. Arthur A. Orning, of Carnegie Institute of Technology, has been elected chairman of the American Chemical Society's division of gas and fuel chemistry. **Dr. John Farley Foster,** of Battelle Memorial Institute, was elected chairman-elect, and **Prof. H. Beecher Charmbury,** of Pennsylvania State College, was reelected secretary.

F. M. Miller, associate professor of chemical engineering at Vanderbilt University, Nashville, has won the junior award of the American Institute of Chemical Engineers, for his outstanding contributions to the literature of chemical engineering.

Paul Thomas, independent consulting geologist, has moved his offices from Jackson, Miss., to Midland, Tex.

Joe G. Smith is superintendent in charge of drilling activities for Thomas E. Pike Drilling Co.'s newly created offices in Reynosa, Mexico. He will direct drilling of Mexican wells under contract to **Edwin W. Pauley,** independent Los Angeles operator.

Lee J. Thronson, Sun Oil Co., Corpus Christi, has been elected 1951 chairman of the Southwestern Texas section of the petroleum branch of the A.I.M.E. Other new officers include: **George Wilson,** Magnolia Petroleum Co., Alice, Tex., vice chairman; **Harry Vaughn,** Lane-Wells Corp,. Corpus Christi, secretary-treasurer; and **R. C. Granberry,** Humble Oil & Refining Co., Corpus Christi, who is retiring chairman, automatically becomes the senior director.

Robert J. Wagner, junior petroleum engineer for Stanolind Oil & Gas Co., has been transferred from Ulysses, Kans., to the West Edmond area, Oklahoma.

James A. Butts, Jr., has joined Tide Water Associated Oil Co. at Kilgore, Tex., as division engineer, replacing **Dan M. LaRoe** who recently resigned. **E. E. Sanders** was named district foreman at Conroe, Tex., for Tidal Pipe Line Co., replacing **H. C. Holt** who has retired.

John B. Flugstad, district engineer for The Texas Co., has been transferred from Denver to Casper, Wyo., as petroleum production engineer.

HIRAM J. CARSON

Hiram J. Carson, vice president in charge of operations for Northern Natural Gas Co., has been named by the board to serve as first vice president. Others appointed to newly created positions include: **Joe T. Innis,** superintendent of operations, named to vice president in charge of operations; **Myrven L. Mead,** company rate engineer, elected assistant to the president; **Larry Shomaker,** superintendent of gas sales, named vice president in charge of sales; and **John M. Hanley,** head of the production department, to vice president in charge of gas supply. Carson, who joined Northern in 1930 as chief engineer, is past president of the Midwest Gas Association. Innis joined Northern in 1930, and in his new position will be in complete charge of pipe-line, compressor, dispatching, measurement, engineering, and construction departments. Mead joined the firm in 1931 shortly after receiving a degree in electrical engineering from University of Nebraska.

MYRVEN L. MEAD

JOE T. INNIS

Alexander W. McCoy, III, formerly district geologist in the Rocky Mountain area for Phillips Petroleum Co., has joined the Tulsa division of Gulf Oil Corp. as chief exploration geolo-

XUM

PERSONALS

gist. He had been employed by Phillips for approximately 5 years, and prior to that time, was a geologist for Deep Rock Oil Corp. and Carter Oil Co.

W. H. Arnold, Magnolia Petroleum Co., has been elected president of the Houston Association of Credit Men, and **Paul A. DuChesne,** of Houston Natural Gas Corp., has been elected vice president.

Walter M. McKellar has been named manager of purchasing stores for Shell Oil Co. of Canada, Montreal division.

Allen Collins, formerly assistant chief engineer at Shell Oil Co.'s Wilmington, Calif., refinery, has been transferred to the company's refinery at Wood River, Ill., in a similar capacity. He was replaced by **R. K. MacIntyre,** formerly inspector engineer at Wood River.

William T. Payne, Big Chief Drilling Co., Oklahoma City, has been elected first vice president of the Mid-Continent Oil and Gas Association. Others elected by the directors at their annual meeting include: **A. H. Weyland,** Arkansas Natural Gas Co., Shreveport, vice president for Louisiana; **C. H. Murphy, Jr.,** Murphy Corp., El Dorado, vice president for Arkansas; **E. B. McGehee,** independent operator, Jackson, vice president for Mississippi; **R. B. Anderson,** W. T. Wagoner Estate, Vernon, vice president for Texas; and **James L. Duffy,** independent operator of Grove Hill, vice president for Alabama.

N. C. McGowen, president of United Gas Corp., was named to a 32-member petroleum-industry advisory council to the Spindletop Fiftieth anniversary commission, which will arrange for the 1951 commemoration of the discovery of oil at Spindletop on January 10, 1901.

Roy P. Northern, Jr., formerly landman for Standard Oil Co. of Texas, has formed an association with **A. R. McElreath,** independent oil operator of Fort Worth. Northern will be in charge of the Midland, Tex., office.

L. E. Ringer, party chief for Advanced Exploration Co., has been transferred from Houston to Dover, Del., in the same capacity.

W. L. Connelly, retired chairman of the board for the Kansas-Oklahoma division of the Mid-Continent Oil and Gas Association, and affiliated with Sinclair Oil & Gas Co.; **Rush Greenslade,** retired vice president of the Tulsa division of the association, and with Gulf Oil Corp.; and **Donald Campbell,** retired general counsel, and with Stanolind Oil & Gas Co., have been awarded life memberships in the association.

Joseph H. Gast, chairman of the department of biochemistry, Baylor University, Waco, has been elected chairman elect of the Southeastern Texas section of the American Chemical Society. Other new officers include: **E. R. Scogin,** Shell Chemical Corp., secretary; **B. B. Smith,** W. H. Curtain & Co., treasurer; **P. L. Brandt,** Pan American Refining Corp., councillor; and **C. E. Lyon,** Diamond Alkali Co., alternate councillor.

Frederick M. Smith has been appointed organic chemist for Deep Rock Oil Corp., at Cushing, Okla. He received his B. S. degree from University of Nevada in 1931, and then attended Syracuse University for his master's and doctorate degrees from 1931-37. Beginning in 1937, he taught chemistry at Texas A. & M. College until 1944 when he joined Phillips Petroleum Co., his last employer.

A. H. Meadows, president of General American Oil Co. of Texas since 1937, has been named executive board chairman of the firm. **Malcolm E. Wilson,** executive vice president, was named to succeed Meadows in the presidency, and **Gordon Simpson,** formerly vice president and general counsel, is the new executive vice president, also continuing as general counsel.

M. F. Bailey, district superintendent for Sinclair Refining Co., has been transferred from Luling to Arlington, Tex., in the same capacity.

H. Lee Norris, Jr., has resigned from the engineering department of Dow Chemical Co. to become chief engineer for Fish Engineering Corp., Houston.

T. Rozsa, area geophysical supervisor for western Canada, Shell Oil Co., has resigned and organized Frontier Geophysical Co. with offices at Calgary, Alta., Canada.

Thomas H. Chilton, technical director of the development - engineering division of E. I. du Pont de Nemours & Co., has been elected president of the American Institute of Chemical Engineers for 1951. **William I. Burt,** vice president of B. F. Goodrich Chemical Co., was named vice president. **Stephen L. Tyler and C. R. De Long,** both of New York City, were reelected secretary and treasurer, respectively. Four new directors chosen were: **Charles R. Nelson,** manager of the process-engineering department of Shell Development Co., Emeryville, Calif.; **Earl P. Stevenson,** president of Arthur D. Little, Inc., Cambridge, Mass.; **R. C. Gunness,** manager of research for Standard Oil Co. (Ind.); and **R. Paul Kite,** manager of the development department of Dorr Co.

***A.I.M.E. OFFICERS GREET PRESIDENT.**—Officers of the Gulf Coast section of the American Institute of Mining and Metallurgical Engineers greeted Dr. D. H. McLaughlin, national president, on his recent visit to Houston. Dr. McLaughlin is president of Homestake Mining Co. Shown greeting him are A. G. Gueymard, City National Bank, Houston; E. L. Petree, Gulf Oil Corp.; Harold Decker, Houston Oil Co. of Texas; G. D. Robertson, Shell Oil Co.; and Joe B. Alford, executive secretary, petroleum branch, A.I.M.E.*

PERSONALS

R. C. Mills, Jr., division exploration superintendent in the West Central Texas district at Abilene for Standard Oil Co. of Texas, has been transferred to the Midland, Tex., office in the same capacity. He succeeds **Gail H. Stoddard,** who has resigned from the firm to become an independent oil operator in that region.

Robert J. Kettenburg has been transferred by Asiatic Petroleum Corp. from New York to the Los Angeles regional office as senior mechanical engineer.

John E. Gallagher, senior mechanical engineer at Los Angeles for Shell Oil Co., has been transferred to Bakersfield, Calif., San Joaquin division as division mechanical engineer. Other changes in the firm include: **Harold E. Radford,** division mechanical engineer at Bakersfield, to Los Angeles as senior mechanical engineer; and **Frances H. Taylor,** senior mechanical engineer at Los Angeles, to Casper, Wyo., Rocky Mountain division as division mechanical engineer.

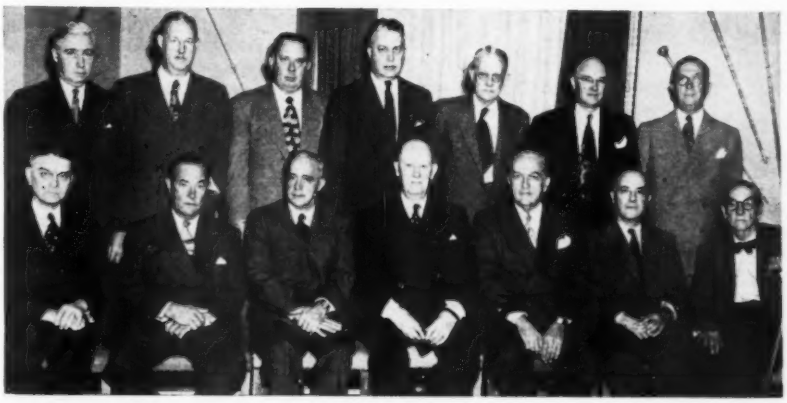
Barnett F. Dodge, head of the chemical engineering department at Yale University, will become the fifteenth recipient of the William H. Walker Award, in recognition for his outstanding contributions to the literature of chemical engineering over the years.

J. M. Lennie, chemist for United Gas Pipe Line Co., has been transferred from Beeville, Tex., to Shreveport, La.

Dell C. Wade, junior petroleum engineer for Stanolind Oil & Gas Co., has been transferred from Refugio, Tex., to Corpus Christi.

W. R. Wight, independent operator, has moved his offices from Fort Worth to Beaumont, Tex.

John T. Jones, district land man for the State of Oklahoma for Magnolia Petroleum Co., has been transferred from Oklahoma City to Calgary, Canada, to be manager of the land department of the Socony-Vacuum Exploration Co., an affiliated organization of Socony-Vacuum Oil Co., Inc. Jones will be succeeded as state district land man by **Grayson Ray,** who has been transferred to Oklahoma City from Wichita Falls, Tex., where he was district land man. Other changes in Magnolia include: **Marvin S. Jones,** Dallas land-department staff, transferred to Wichita Falls as district land man; **William K. Brewster,** Oklahoma City land-department staff, to the firm's general offices in Dallas; and **Robert W. Harless,** Dallas land department, transferred to the Oklahoma City staff.



TIDE WATER OFFICIALS.—Officers and directors of Tide Water Associated Oil Co. attending its board meeting in Houston last week included: Front row: U. B. Boucke, San Francisco; Harry C. Hunt, Monterrey, Calif.; Joseph D. Peeler, Los Angeles; William F. Humphrey, R. D. Brigham, and Walter A. Haas, San Francisco; and Johnston DeForest, New York. Second row: Severance A. Millikin, Cleveland; B. I. Graves, New York; John H. Wents, Jr., Los Angeles; H. S. Chase, New York; L. D. Jurs, San Francisco; and L. F. Bayer, San Francisco; and E. H. Salrin, Houston. Not pictured, but in attendance, was John Hay Hopkins, Washington, D. C.

William A. Hamor, assistant director of Mellon Institute, has been named by the Pittsburgh section of the American Chemical Society to receive its Pittsburgh Award for 1950, for his outstanding service to chemistry.

T. A. Aldridge has been appointed director of industrial relations for American Oil Co., and **James K. Eagan, Jr.,** named general counsel.

A. D. Hunter, Humble Oil & Refining Co., has been elected president of the Houston Landmen's Association, succeeding **Wylie Summers,** McCarthy Oil & Gas Co. Other new officers include: **Gerald E. Faust,** Magnolia Petroleum Co., vice president; **Dave O. Fretz,** Union Oil Co. of California, secretary; and **J. H. Roberts,** Gulf Oil Corp., treasurer.

DEATHS

Frederick O. Sharp, 53, office manager for Larkin Torpedo Co., died December 1 in Tulsa. He had been employed by Larkin for 30 years.

Albert Leroy Ellsworth, 74, board chairman and a founder of British American Oil Co., Ltd., in 1906, died November 28 in Toronto, Ont. He was also founder and a director of Toronto Iron Works and founder as well as chairman of the board of the companies which now comprise International Metals Industries, Ltd. He founded British-American Oil Producing Co. in 1925.

J. A. Clark, 73, retired employe of Humble Pipe Line Co., died November 23 at Hearne, Tex.

W. Scott Heywood, 78, who brought in Louisiana's first oil well in 1901, died November 28 at Jennings, La.

Joseph Altshuler, vice president of Stratford Engineering Corp., died November 27 in Kansas City. He was closely identified with the construction of alkylation facilities in this country during World War II.

C. M. Nye, 44, independent oil operator, died November 13 in Oklahoma City. He had formerly been land man for Sunray Oil Co.

Oscar N. Wallace, 61, assistant production manager for Standard Oil Co. (Tex.), died November 26 at La-Porte, Tex.

Lewis Dunk, retired engineer with Tide Water Associated Oil Co., Bayonne, N. J., died November 28 at Laurence Harbor, N. J.

Edward Henry Roorbach, 51, for 29 years head accountant for the Socony-Vacuum Oil Co., Inc., at Liberty, Mo., died December 3 at Liberty.

Arthur George Hutton, 63, former superintendent of the refinery of the Waggoner interests at Electra, Tex., died at Gainesville, Tex.

XUM

MARINE PLATFORMS

for offshore drilling

by C. A. Trexel

The caisson-pier type construction, described here, offers both economy and wide flexibility

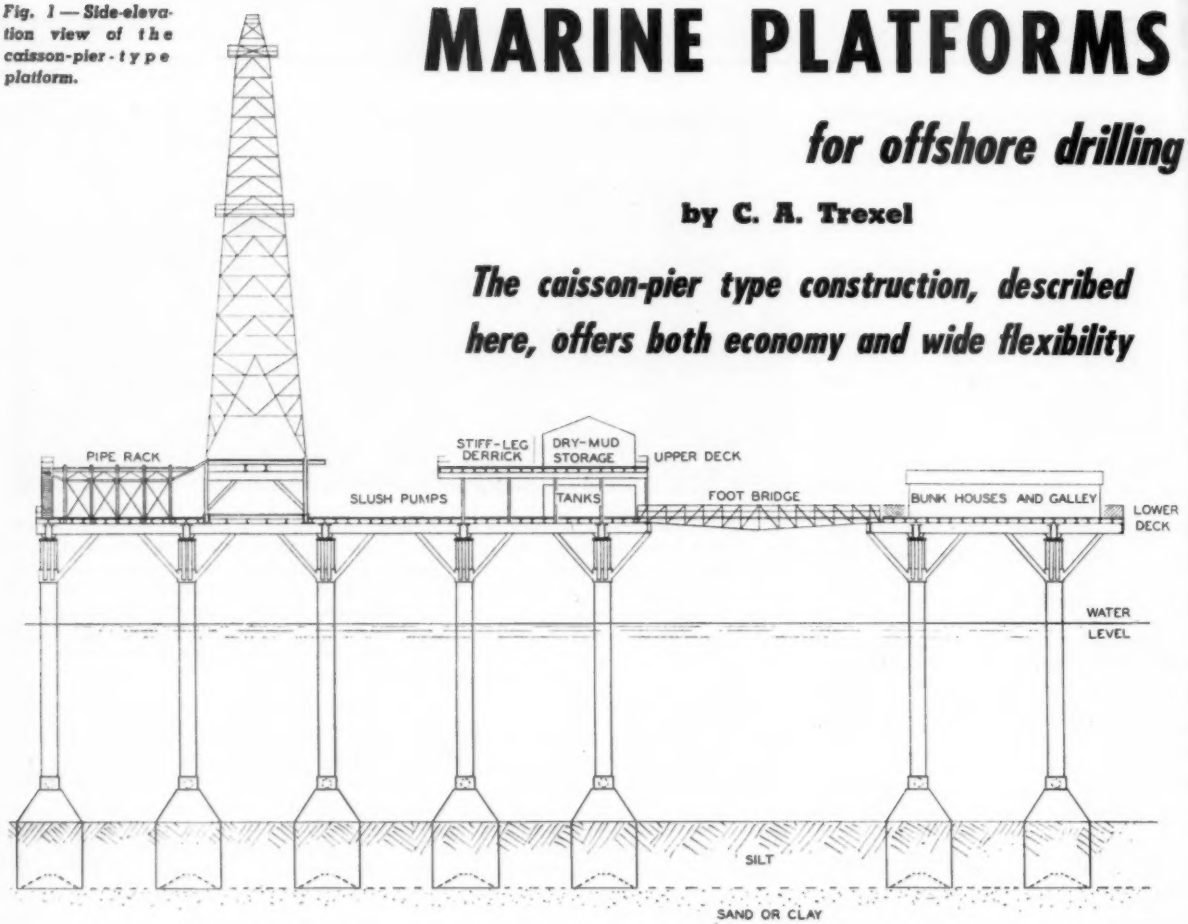


Fig. 1 — Side-elevation view of the caisson-pier-type platform.

SINCE 1938 around 234 million dollars has been spent in searching for oil in the Gulf of Mexico, and only 6.3 million dollars has been returned as gross revenue from oil produced. Of a total of 190 offshore wells drilled, 60, scattered in 14 oil fields, off the Louisiana coast, are producing at an allowable rate of 11,000 bbl. per day. Also 14 gas-condensate fields and a dry gas field, all of which are shut in, also have been found.

Despite the meager returns from so large an investment, and the confusion created by federal-state controversy over the tidelands, the oil companies are optimistic over the potentialities of the Continental Shelf. These companies are interested in continuing or resuming offshore operations as soon as the tidelands impasse is resolved.

Of the millions spent for offshore operations in the Gulf, 48 million dollars were for geophysical work, 60 million for lease bonuses and rentals, and 126 million for marine equipment, platforms, and drilling.

One of the factors contributing to the heavy cost of offshore operations is the marine platform from which drilling operations are conducted. In 1948 a large self-contained platform built for one of the major oil companies cost $1,230,000. Although costs have been reduced since then, they are still high. With a view to further reducing platform costs, some companies have adopted a combination of a smaller platform containing only the derrick, draw works, engines, and reserve pumps, with a barge drilling tender. Usually this tender is a converted LST or YF barge, which carries all other equipment and supplies and provides accommodations for the drill crews. Choice between self-contained platforms and tenders is based on an economic comparison of the additional cost of marine operations plus drilling time lost when the tender is obliged to slip its moorings because of weather conditions, as compared with the additional cost of a large platform over a small platform. There are proponents of both practices.

Three Types of Drill Barges

For shallow-water operations, some companies use a mobile drill barge, usually self-propelled and submersible for stability while drilling. Consideration has more recently been given to the use of mobile drill barges for use in deep water. Three have been proposed:

1. The DeLong-Marine Contracting Corp. barge in which the drilling platform is jacked up and supported on six 6-ft.-diameter caissons which rest on and in the bottom.

2. A barge developed by J. R. Pemberton and Hillman A. Hansen for drilling in water from 50 to 350 ft. deep, in which the drilling platform is supported between three 450-ft. towers positioned at the corners of an equilateral triangularly shaped submersible platform.

3. The Armstrong-Sun Seadrome, which like the DeLong barge is supported on caissons resting on bottom, except that the caissons are provided with enlarged bases and the soil loading on the bottom can be kept at a relatively low value by regulating buoyancy of the caissons. It is designed to drill in water from 12 to 80 ft. deep, but, it is stated, can be modified for depths up to 120 ft. These mobile barges are proposed primarily or exclusively for exploration work, so that permanent structures of some sort would be required in any case if oil were found.

Up to the present time all platforms built in the gulf have been supported on piles driven to required bearing value. A pile type of platform would be required where there

are great depths of silt or other soft material, as is the case near the Mississippi Delta. However, where soil bearing can be developed within a reasonable depth below the surface of the bottom, a caisson pier type of platform designed for soil bearing would have an advantage from a cost standpoint. Locations suitable for the soil bearing caisson-type platforms include areas off western Louisiana, Texas, the Yucatan Peninsula, California, and in the Persian Gulf.

Essential elements of the caisson piers are relatively large bases for stability, and relatively small pier columns to present a minimum obstruction to wave forces. The bases are usually of concrete and compartmented for control in sinking. The columns are of steel, or in some cases where fire protection is an especially important consideration, of prestressed concrete or concrete with a steel liner. The cone-shaped transition between the base and column is normally of concrete.

For water depths from 60 to 100 ft., the diameter of bases would be about 25 ft., and the height of bases variable, dependent in part on the depth of silt cover over suitable foundation material. Diameters of steel columns vary from 48 to 60 in., and the steel thickness from ¾ to 1 in.

Ejecting Unsuitable Material

A large-diameter pipe (12 to 16 in.) through the center of the caisson pier column serves as a means of ejecting unsuitable foundation material pumped from under the caisson base; it also serves as a means of placing gravel and a plug of tremie concrete in this same space when cleaned out. Water pipes for jetting and air pipes for ejecting water from the caisson compartments during sinking and raising operations are also run down through the column.

For water depths not to exceed 100 ft., required bracing to resist winds of 125 m.p.h. and waves 32 ft. high is provided in abovewater portal-type bracing. For this depth of water, no underwater bracing is required except for a strut near the bottom in the caisson pier braced frame.

Required soil-bearing values are of modest proportions, not to exceed 1 ton per sq. ft. for all vertical loads including the derrick, draw works, engine, pumps, wet and dry mud, drill pipe and casing, water and fuel tanks, stiff-leg derricks, and miscellaneous equipment. Soil-bearing values are not to exceed 2 tons per sq. ft. including the vertical components from horizontal wind and wave forces, and earthquake where applicable.

The caisson-pier type of platform can be designed and built as a completely self-contained platform as shown in Fig. 1. The large type as used by one of the oil companies has a separate island personnel platform, carrying two bunk houses and a galley, connected to the main platform by a foot bridge. If oil is found, and after all wells have been drilled, all but the section of the main platform carrying the derrick is dismantled and removed. If all holes are dry, the entire structure is removed and used elsewhere.

Reducing On-Site Construction

Erection of offshore platforms under the unpredictable and sometimes very hazardous weather conditions which obtain in the gulf can be a not inconsiderable task. It is of the essence to reduce on-site construction time to a minimum. This means that caisson piers must be erected expeditiously and also accurately to line and grade in order to facilitate the subsequent erection of the superstructure. Special equipment and procedures developed to meet these requirements are described in the following paragraphs.

Caisson piers are constructed at a convenient waterfront construction yard. After launching, the caisson piers are assembled as a two-pier braced-frame bent, or as a three-pier bent. The braced bents have positive buoyancy and float. To transport these caisson pier bents to, and erect them at the platform site, a specially equipped barge and unique erection procedure are employed. The upper part of the braced bent is supported on the specially equipped barge in

(Continued on page 91)

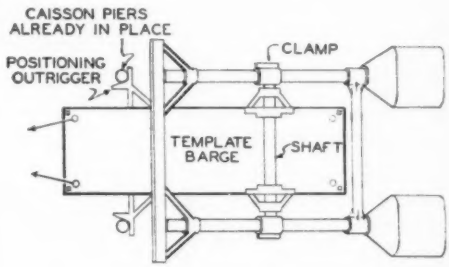
THE AUTHOR

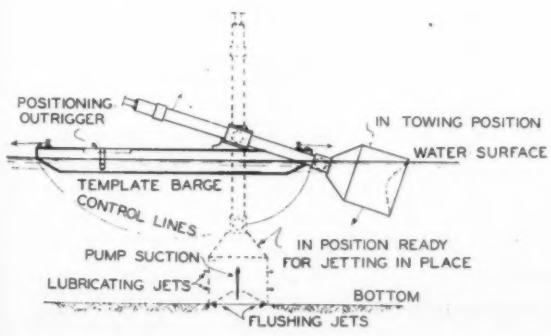
Rear Adm. C. A. Trexel, Civil Engineer Corps, USN, retired from the Navy, April 1950, after 32 years' service to take his present position of executive manager, International Marine Platform Constructors, San Francisco. Among other Navy assignments, Trexel served as director of planning and design, Bureau of Yards and Docks, as United States Navy member of the joint United States-British committee on artificial harbors used in the cross-channel invasion of Europe; and as engineering adviser on the Wedemeyer mission to China and Korea. His last assignment was as director, Pacific and Alaskan divisions, Bureau of Yards and Docks. He has had some connection with the industry, first in 1928-1930 as inspector, Naval Petroleum Reserves, in charge of Tea Pot Dome field developed by the former Mammoth Oil Co., and on his last assignment had cognizance of the Navy's petroleum-exploration operations above the Arctic Circle in the vicinity of Point Barrow.

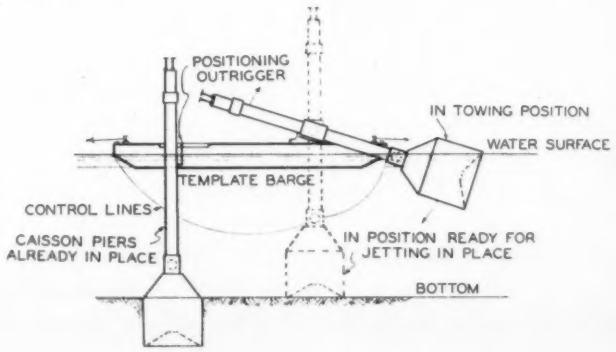
Fig. 2—(Lower left) Sinking operation at platform site.

Fig. 3—(Right) Caisson-pier frame towed to platform site.

Fig. 4—(Lower right) Positioning and sinking operations for second and subsequent frames.







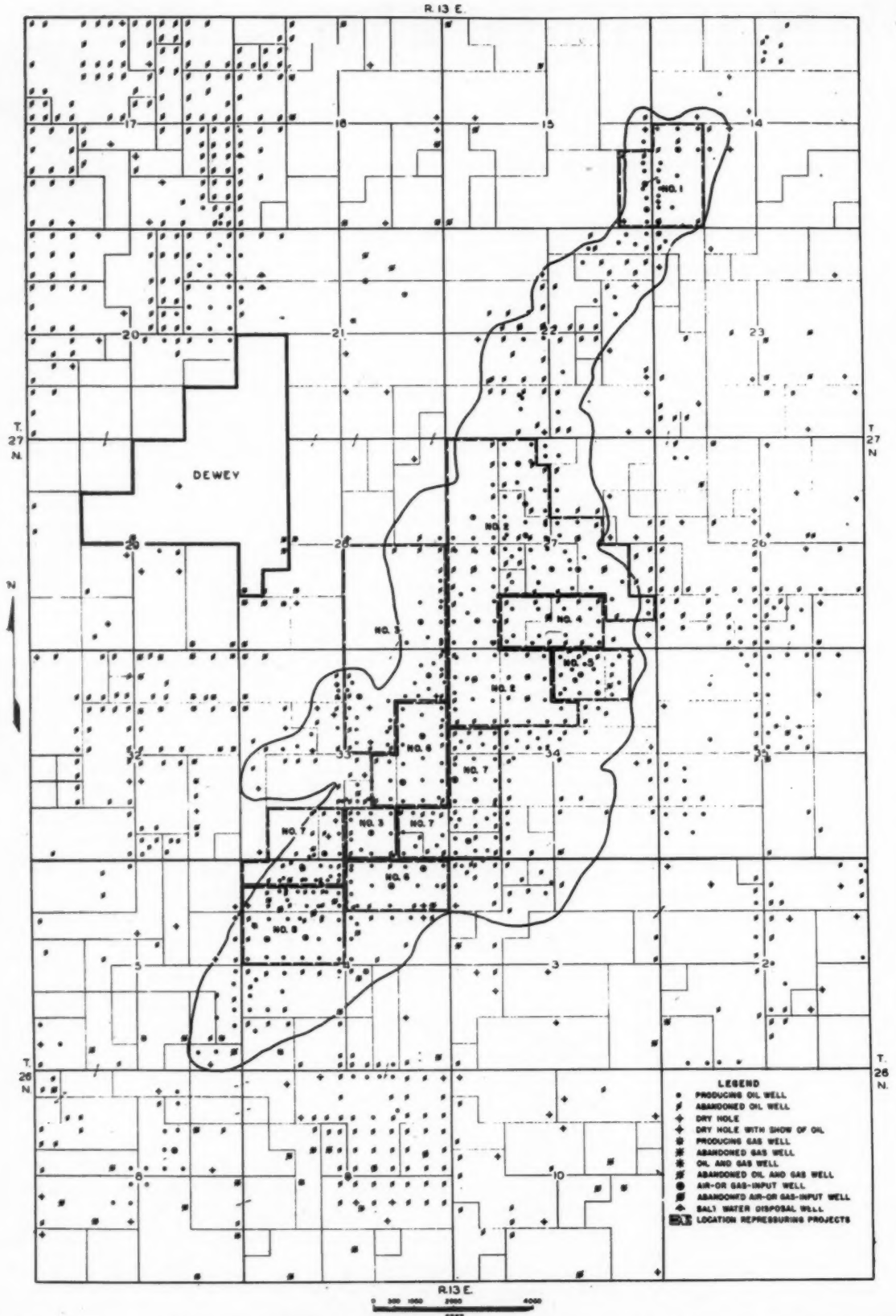


Fig. 1—Development map showing location and status of wells and repressuring projects, Weber Pool, Washington County, Oklahoma.

Water Flooding in Weber Pool

—Washington County, Oklahoma

by James H. Johnston* and James A. West*

PART 1

WATER-FLOODING operations in Oklahoma were originally concentrated in Nowata and Rogers counties in the northeastern corner of the state. Although the Bartlesville sand, which was being flooded, extends westward into Washington and Osage counties, these areas were neglected because the sand dips to the west, which increases development and operating costs. Recently, Washington and Osage counties have been the scene of intensive water flooding. One particularly active area is Weber pool, a part of the greater Bartlesville-Dewey field in Washington County.

In this series of articles a description of the Weber pool reservoir and its past production history will be followed by a discussion of each water-flooding project in the pool. Although all of the projects in the pool are too new to permit an accurate estimate of their ultimate success, their performance to date, the reservoir conditions, and the past production history of the pool indicate that they should be as successful as the Nowata and Rogers counties operations.

Weber pool, located 26-27n-13e, is approximately 4 miles long and 1½ miles wide at its widest point and contains 2,708 productive acres, of which 2,639 acres are developed. The detailed location and extent of the field are shown by the development map (Fig. 1).

The discovery well was completed November 11, 1905, at a depth of 1,237 ft. in the Bartlesville sand, by T. N. Barnsdall (now Sunray Oil Corp.) in 27-27n-13e. The oil-producing formation was found at 1,211 to 1,237 ft. Initial production was estimated to be 300 bbl. of oil per day. The pool was developed rapidly and by 1909 most of the productive limits were established. The peak in drilling was reached in 1907, and although many wells were completed during 1908, activities diminished rapidly and drilling was virtually terminated by 1910.

Drilling and Completion Practices

During the early development of Weber pool wells were drilled with standard cable tools using wooden derricks. About 1910, portable cable-tool-drilling machines were brought into the area and were used for the next 20 to 25 years to drill the wells.

*Petroleum engineer, Bureau of Mines.

This article is the first in a series of condensations of Bureau of Mines Report of Investigations entitled "Petroleum Engineering Study of the Weber Pool, Washington County, Oklahoma," which will be released in the near future. The Bureau of Mines report will contain 38 illustrations and 13 tables. It includes a history of the pool's development, a description of the geology, numerous illustrations showing sections through the pool, production statistics, production practices, reserve calculations, and detailed descriptions of the operation and results of air and gas injection and water flooding.

Copies of this report may be obtained from the Bureau of Mines, Publications Distributions Section, 4800 Forbes Street, Pittsburgh, Pa.

In recent years spudding machines have been used.

Usual drilling procedure was to set a conductor pipe, of 10-in. casing, through the surface soil or gravel and to drill a 10-in. hole 100 to 200 ft. deep, depending on the depth to a shallow water sand occurring in this area. A temporary string of 8¼-in. casing was set through the water sand, and an 8-in. hole was drilled to approximately 1,150 ft. A string of 6⅝-in. casing then was set on a casing shoe. The temporary string of 8¼-in. casing was pulled, and a 6¼-in. hole was drilled into the oil sand.

The seal formed by the casing shoe on the formation shoulder usually was sufficient to shut off upper waters, and subsequently it has been necessary to cement only a few wells to eliminate leaks at the casing seat. In completing the wells, the Bartlesville sand was shot with nitroglycerin, the charges ranging from 2 to 4 qt. per foot of oil-producing section.

Initial Production

Initial productivity of wells in the Weber pool during the period of "flush" production was comparatively high for wells producing from the Bartlesville sand. A few logs record initial daily oil production of 1,000 to 2,000 bbl., although most of the wells initially produced 100 to 200 bbl. of oil daily. Many logs record a gas sand above the oil sand and most of the wells that initially produced oil at high rates also produced large volumes of gas.

Most of the early wells in the pool flowed naturally for several months after completion, but the rapid exhaustion of the reservoir pressure by unrestricted production resulted in the early introduction of pumping equipment. The wells were jack pumped by pull rods from geared or band-wheel central powers.

None of the early records pertaining to well completions showed the presence of water in sufficient quantities to indicate a natural water, and subsequently very little water has been produced from wells in the pool. Probably most of the produced water entered the Bartlesville sand from the surface or upper horizons through

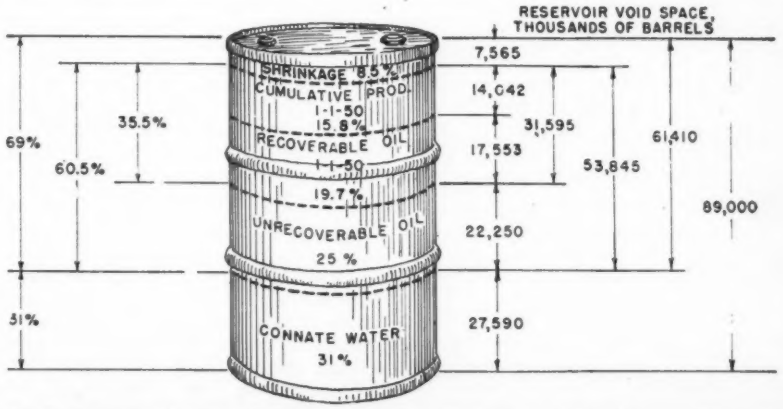


Fig. 2—Schematic drawing showing fluid content of average barrel of pore volume and reservoir void space each occupies in the Weber Pool, Washington County, Oklahoma.

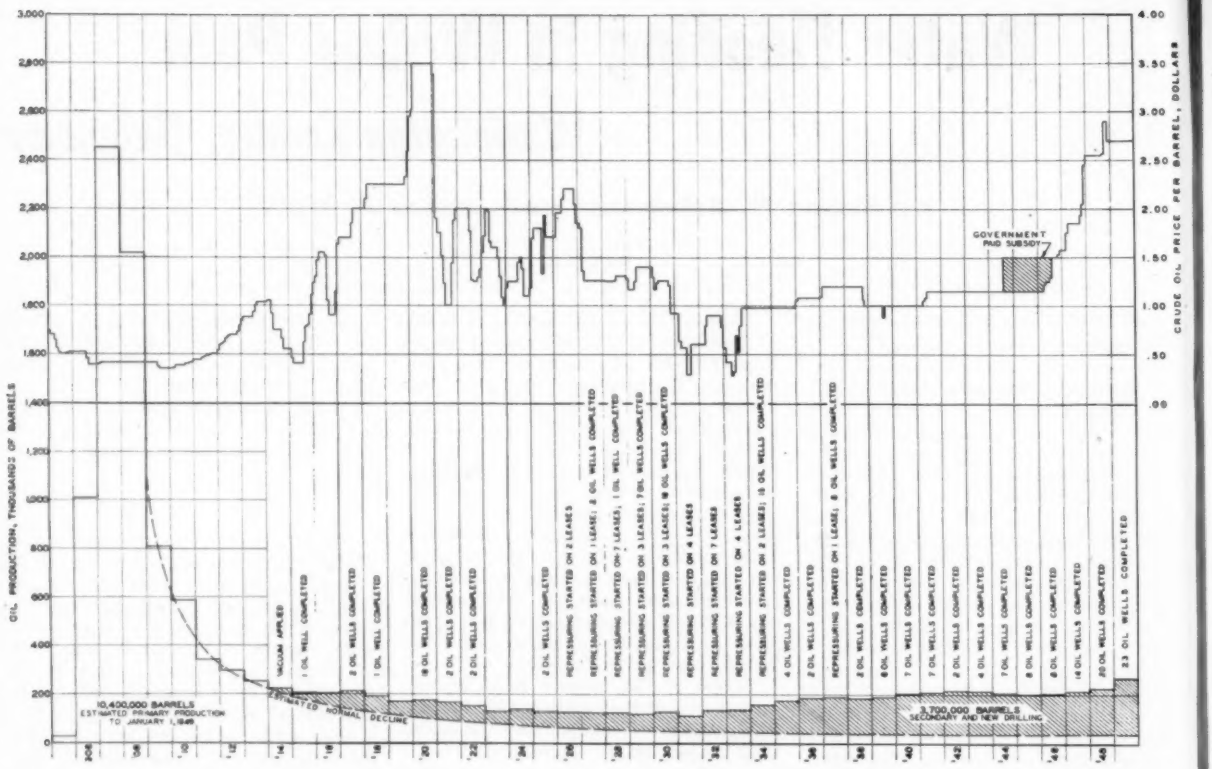

OIL PRODUCTION, THOUSANDS OF BARRELS
CRUDE OIL PRICE PER BARREL, DOLLARS
GOVERNMENT PAID SUBSIDY
10,400,000 BARRELS ESTIMATED PRIMARY PRODUCTION TO JANUARY 1, 1949
ESTIMATED NORMAL DECLINE
3,700,000 BARRELS SECONDARY AND NEW DRILLING

Fig. 3—Oil production by years and average monthly price paid for a barrel of crude oil, Weber Pool, Washington County, Oklahoma.

improperly plugged wells, leaky pipe, or poor casing seats.

Subsurface Structure

The available data on the base of the sand were considered to be the most accurate on which to base a structure map, because most of the wells in the pool are drilled through the sand and are completely in a shale or thin limestone bed that provided a good marker.

Bass et al[1] have presented data to show that the Bartlesville and Burbank sand pools of northeastern Oklahoma were formed as offshore bars and that many of the Bartlesville sand lenses trend northeast-southwest. Apparently the Bartlesville oil sand accumulations in Weber pool and immediate vicinity follow this type of development.

The Bartlesville sand is not continuous but is in the nature of sand bars or lenses, the sand pinching out or grading into sandy shale and shale between the areas of sand accumulation. The largest and thickest of these bars or lenses underlies the area of the Weber pool, oil being produced from separate sand lenses adjacent to the pool.

Oil and Gas-Producing Zones

Within the limits of the Weber pool oil is produced exclusively from the Bartlesville sand, with the exception of one well in 34-27n-13e, which produces from the Peru sand. This report is confined to a consideration of production from the Bartlesville sand.

The Bartlesville sand in Weber pool is overlain by a thick section of dark-gray to black shale. A black shale usually is found near the top of the sand, and often a thin layer of coal is present in the black shale. Some wells penetrate a thin layer of limestone above the sand.

Just below the black shale is a thin layer of light-gray to white shale or siltstone, which usually contains many brown to black siliceous and limy oolites and nodules. Normally, the light-gray shale is about 35 to 40 ft. above the oil-productive sand, and in some places it grades directly into a very fine sand or silty sand, which is logged as gas sand. Usually it is underlain by a gray shale containing thin laminations of white siltstone and a variable thickness of gas sand. Where a gas sand is present, it may grade directly into oil sand, or it may be separated from the oil sand by a layer of shale. Ordinarily the oil sand is brown, medium to fine, angular, sandstone that will vary from 10 to 70 ft. in thickness, but usually is 30 to 40 ft. thick.

Some parts of the oil sand contains laminations of dark-gray shale and large nodules or brown sandy mudstone. Near the bottom the oil sand grades into a black gilsonitic sand. Although this black sand is not always present, most of the wells penetrated 5 to 10 ft. of it. A few logs record this black sand as the "Tucker sand," and consider it is different from the Bartlesville sand.

Examinations of cores and drill cuttings from new wells in the pool, however, show that the brown sand grades into the black sand without any break, and that the black sand actually is the bottom few feet of the Bartlesville sand. The base of the oil sand grades into a bluish-green to gray shale. In a few wells a broken, shaly sand section or a thin layer of limestone is found directly below the oil sand. A thin layer of limestone and 5 to 10 ft. of gray shale usually underlie the sand.

A map showing the total thickness of the oil-producing zone of the Bartlesville sand indicates an average thickness of 37 ft. for the pool as a whole. A maximum thickness of 80 ft. in the SE¼ 4-27n-13e, is questionable, because no wells have been drilled in this area for many years, and the logs on the old wells are incomplete and may be inaccurate.

Effective Thickness of Oil Pay Zone

Detailed descriptions of the sand from 40 cored wells and microscopic examination of drill cuttings from 25 other wells drilled in Weber pool indicate that the oil pay zone of the Bartlesville sand ranges from virtually a clean sand body to zones that are interbedded with shale fingers. Core analyses of the black sand found at the base of the Bartlesville sand pay zone show a high residual-oil saturation but low porosity and per-

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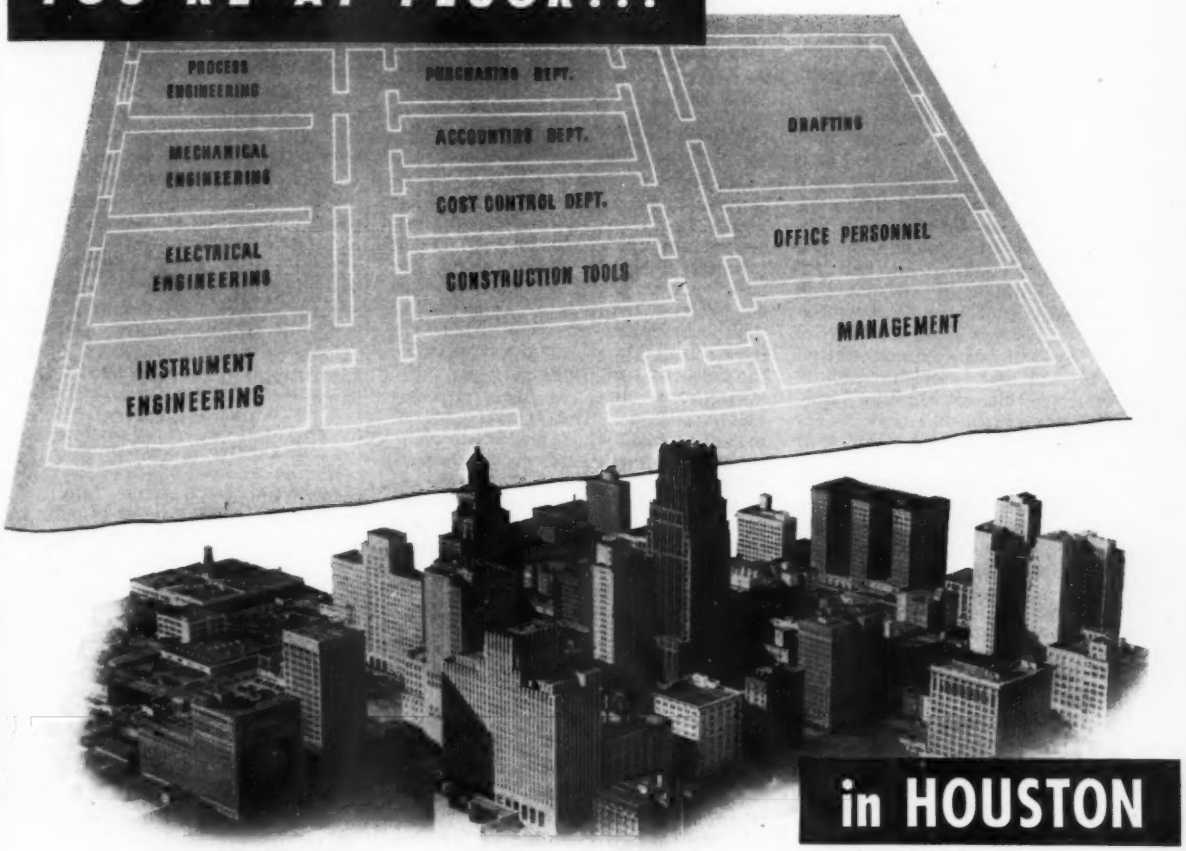

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meability. Flood-pot tests indicate that the black sand should be productive in some areas and nonproductive in others. Although believed to be productive to some degree, the sections of low porosity and permeability in the black sand were eliminated in calculating the effective thickness of the oil-producing sand.

Based upon these data, it was estimated that in areas where the oil pay zone is 30 ft. or less in thickness, 50 per cent of the total sand thickness shown by air isopachous map consists of shaly beds of low permeability and tight sand streaks that for practical and economical purposes can be considered nonproductive of oil. Likewise, it was estimated that 40 per cent of the total thickness is nonproductive where the oil pay zone is 30 to 40 ft. thick, and that 30 per cent is nonproductive where the zone is over 40 ft. thick.

The areas between contour lines were determined for each lease with a planimeter. The effective sand thickness in each of these areas was calculated by multiplying the average thickness, represented by the two limiting contour lines (total thickness), by the proper factor (described above) to correct for the nonproductive part of the sand. The sum of the products of the areas on each lease by the corresponding sand thickness gave the volume of productive sand covered by each lease. A total of 62,013 acre-ft. of sand in Weber pool was estimated to have been oil-productive originally.

Porosity and Permeability

Cores from edge wells show that the average porosity of the Bartlesville sand decreases along the edges of the pool. A number of dry holes near the productive limits of the field logged considerable sand thickness in which the effective porosity apparently was too low to produce oil in commercial quantities. From all available data the average porosity of the Bartlesville sand underlying each lease in the pool was estimated. These values range from 16 to 20 per cent and average 18.5 per cent. It is assumed that this pore volume, amounting to 89,000,000 bbl., was completely saturated originally with oil and interstitial water. Fig. 2 is a schematic drawing showing the fluid content of the average barrel of pore volume in Weber pool reservoir, and the barrels of void space each occupies.

The permeability of the Bartlesville sand underlying Weber pool varies both horizontally and vertically. The horizontal permeabilities of the cores from 40 wells range from 0 to 230 md. and average 66 md.

Interstitial Water

The interstitial (connate) water saturations of 179 samples, selected from nine cored wells in Weber pool to cover the full range of permeability, were determined by the restored-state method. Based upon these data, the weighted average original water saturation of the oil-producing section of the Bartlesville sand in Weber pool was estimated to be 31 per cent and the original oil saturation 69 per cent (see Fig. 2).

Original Reservoir Pressure and Temperature

No initial reservoir pressures or temperatures were recorded in Weber pool. The relatively high initial oil-producing rates indicate that the original pressures were normal for reservoirs at depths of 1,180 to 1,280 ft. Normal hydrostatic pressures at depths between 1,180 and 1,280 ft. range from 530 to 580 psi.; therefore, the average initial reservoir pressure is estimated to have been approximately 560 psi. The temperature of the oil-pay section of the Bartlesville sand was determined on four wells with a bottom-hole temperature-recording instrument and found to average 88° F. As the Bartlesville sand contained excess gas, the reservoir oil probably was saturated with gas at the formation pressure and temperature.

Shrinkage of Oil

Few data are available for estimating the volume of gas originally dissolved in a barrel of reservoir oil and the shrinkage of oil resulting from gas liberation. The Bartlesville sand fields in northeastern Oklahoma were developed before the practice of subsurface sampling was started. The high gasoline content of the casing-head gas (2 to 6 gal. per 1,000 cu. ft. in 1914) in Weber pool indicates that the gas was comparatively soluble in the reservoir oil.

As data are not available on the volume of gas in solution initially and the shrinkage of the reservoir oil upon being produced, these values were estimated by using analyses of subsurface oil samples from a number of other fields that produce similar oil. It was estimated that the solution gas-oil ratio was approximately 270 cu. ft. of gas per barrel of stock-tank oil and that 1.14 bbl. of initial reservoir oil was equivalent to 1 bbl. of stock-tank oil.

The reservoir oil which originally occupied 69 per cent of the void spaces in the oil-producing sand, would shrink, when measured at the surface, to a volume representing only 60.5 per cent of the pore spaces in the sand (Fig. 2). The 61 million barrels of reservoir oil would be equivalent to approximately 54 million barrels of stock-tank oil, or an average of 870 bbl. of oil per acre-foot of sand.

Recoverable Oil

From flood-pot tests on core samples, the results of floods in other Bartlesville sand fields, and other available information, it is estimated that the oil saturation of the reservoir can be reduced to about 25 per cent by water flooding. By deducting the 25 per cent residual saturation from the 60.5 per cent saturation after allowance for shrinkage the original recoverable stock-tank oil is found to be equal to 35.5 per cent of the void space in the reservoir, as shown in Fig. 2. The total recoverable oil originally in the Weber pool is calculated to have been approximately 32 million barrels, or an average of 510 bbl. per acre-foot of oil-producing sand based on the estimated volume of the reservoir of 62,013 acre-ft.

Primary Production

The quantity of oil produced yearly from 1905 to 1949, inclusive, from wells in Weber pool is shown graphically in Fig. 3. As a result of the many oil wells completed in 1907,

TABLE 1—SUMMARY OF DATA REGARDING AIR AND GAS-INJECTION PROJECTS, WEBER POOL, WASHINGTON COUNTY, OKLAHOMA

	Project								
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	Total
Total productive area, acres	112	485	222	80	60	180	206	116	1,461
Estimated volume of sand, ac.-ft.	1,865	14,428	4,135	2,216	1,583	5,200	6,779	4,572	40,778
Total oil wells drilled	18	109	57	23	20	40	81	36	382
Total active oil-producing wells, January 1, 1950	*14	*67	37	*11	12	*26	39	23	226
Total gas-input wells	4	13	4	1	3	4	6	4	39
Total active gas-input wells, January 1, 1950	*3	*7	4	0	2	*4	5	2	27
Total oil production, Jan. 1, 1950:									
Thousands of barrels	566	3,582	1,232	540	340	1,154	1,953	1,184	10,541
Barrels per acre	4,964	7,386	5,543	6,750	5,667	6,411	9,480	10,207	7,215
Barrels per acre-foot	298	248	298	244	215	222	288	259	258
Primary oil production,† Jan. 1, 1950:									
Thousands of barrels	288	2,931	905	382	252	858	1,178	661	7,455
Barrels per acre	2,571	6,043	4,073	4,775	4,200	4,767	5,718	5,698	5,103
Barrels per acre-foot	154	203	219	172	159	165	174	145	183
Repressuring oil production,‡ Jan. 1, 1950:									
Thousands of barrels	267	644	327	126	87	296	775	523	3,045
Barrels per acre	2,384	1,328	1,470	1,575	1,450	1,644	3,762	4,509	2,084
Barrels per acre-foot	143	45	79	57	55	57	114	114	74
Water-flood oil production,§ Jan. 1, 1950:									
Thousands of barrels	1	7		32	1				41

*Status January 1, 1949. †Normal decline of primary production extended to January 1, 1950. ‡Total production less primary and water-flood production. §Total production less primary and repressuring production.

the field attained a peak rate of production that year of about 2½ million barrels of oil, but thereafter the rate of production declined rapidly to approximately 350,000 bbl. per year in 1911. After 1911, the decline in the rate of production became more gradual. From the discovery date to 1949, inclusive, it is estimated that 10,400,000 bbl. of oil would have been produced from the Bartlesville sand in Weber pool without the benefit of secondary-recovery* operations, and that an additional 3,700,000 bbl. of oil was gained by the application of vacuum, drilling of new oil wells, the injection of gas into the producing formation, and the start of water-flooding development on three projects. An estimate cannot be made, from the production-decline curve, of the ultimate recovery under present producing methods as the rate of production from the field has been increasing gradually for more than 15 years as a result of expanding secondary-recovery operations and drilling of new wells. Water-flooding projects now being developed in the field no doubt will result in a sharp upward trend in the rate of production from the pool in the near future.

The market price of crude oil (Fig. 3) fluctuated considerably during development and operation of Weber pool, and these fluctuations, no doubt, played an important part in determining the timing of various development and operating practices.

Vacuum Operations

Vacuum was applied first to many of the leases in Weber pool in the latter part of 1914 and in 1915. The availability of considerable "wet" gas resulted in the construction of several natural-gasoline plants and gathering facilities by operators in the natural-gasoline industry. The largest plant, using the compression method of liquefaction, was completed during March 1915. About 10,000 gal. per day of natural gasoline was recovered by processing 2,500,000 cu. ft. of natural gas daily. This plant extracted 2 to 6 gal. of natural gasoline per thousand cubic feet of gas and returned enough gas to the operators for lease requirements. The remaining dry gas was vented to the air at the natural-gasoline plants, as was residue gas from most of the Mid-Continent fields.[2] The natural-gasoline plants applied vacuum, equivalent to about 25 in. of mercury to the gathering lines, which reduced the casing-head pressure at the wells to approximately 18 in. of mercury vacuum. By 1931, the volume of available gas was too small for economical processing, and the natural-gasoline extraction plants were abandoned. The oil operators installed vacuum pumps, and the application of vacuum on the wells was continued for the increased rate of oil production it yielded. On January 1, 1950, most of the vacuum plants were still in operation.

The wells on most of the leases in Weber pool responded favorably to the application of vacuum. Many wells were drilled prior to repressuring,* however, and it is not practical to estimate the quantity of oil attributable to vacuum, although the production curve for field, Fig. 3, shows that some increase in the rate of oil production resulted from vacuum operations.

Air and Gas Injection

Repressuring operations in Weber pool began in 1926 with injection of gas† into wells on properties in Sections 14, 15-27n-13e. The success of this operation resulted in development of several other repressuring projects in the pool. The location and extent of the eight air and gas-injection projects developed in Weber pool are shown on the development map (Fig. 1).

The repressuring projects were developed in accordance with conventional methods that were practiced in the Mid-Continent area in the early twenties. The spacing of gas-injection wells relative to producing oil wells on all the projects was extremely irregular, showing no conformity to the typical geometric pattern used in many modern intensively developed projects.

In general, the injection wells, many of which were converted oil wells, were located in areas where the well density was greatest. If possible, wells producing the least oil were chosen for conversion to injection wells. The common practice, when converting an oil well to a gas-input well, was to pull the sucker rods and tubing, connect the gas line to the casing head, and inject the repressuring medium into the producing formation through the casing. If the casing in the well was defective, tubing was run and a tubing packer was set below the break in the pipe; the gas was then injected through the tubing. If the well took gas satisfactorily, no remedial work was done. Most of the gas-input wells have been used for many years, and very little service has been required to maintain these wells in proper operating condition.

The surface equipment on gas-injection wells in Weber pool varies in design. All of the wells have a 2-in. manifold with either a 2-in. valve or a ½-in. bypass line equipped with a stopcock for controlling the rate of injection. Some of the wells are equipped with an orifice flange having pressure gage and manometer connections for use in making periodic measurements of the rate of injection of the repressuring medium.

Good efficiency was not attained by the gas-injection projects in Weber pool because of the irregular and wide spacing of the injection wells, the continued use of vacuum, and the inadequate control of the rate of injection at the input wells. Except for one project, the performance of the gas-injection wells was not recorded. It, therefore, has been impossible to ascertain the volume of air and gas injected. Fortunately the oil-production records of all the leases comprising these projects and adjoining leases affected by repressuring are available. The recovery of oil from these leases is indicative of the relative efficiency of repressuring.

Except for one project (No. 2, Fig. 1) air has not been used as the injection medium. During the early stages of operation some gas for repressuring was obtained from formations other than the Bartlesville sand, but this supply was inadequate to offset the fuel requirements and the usual losses occurring during the years of operation. As a result, the quantity of gas available for repressuring diminished rapidly and now is inadequate for this purpose.

Pertinent data regarding the repressuring projects in the pool are summarized in Table 1.

It is estimated that 10,541,000 bbl. of oil, equivalent to 7,215 bbl. per acre, or 258 bbl. per acre-foot, were recovered by January 1, 1950, from the 1,461 productive acres included in eight repressuring projects in the pool. Based upon a normal decline curve, it is estimated that 7,455,000 bbl. of oil (5,103 bbl. per acre, or 183 bbl. per acre-foot) would have been recovered by January 1, 1950, from the acreage included in the projects without the benefit of secondary-recovery operations.

Approximately 3,045,000 bbl. of additional oil, equivalent to 2,084 bbl. per acre, or 74 bbl. per acre-foot, was produced between 1914 and 1950 as a result of the application of vacuum, air and gas-injection, and the drilling of 130 new oil wells. An additional 41,000 bbl. of oil was produced as a result of water-flooding operations started in 1948.

Prospects for Water Flooding

Although permits have been granted by the Oklahoma Corporation Commission to water flood 1,480 acres in six projects in Weber pool, only one project (80 acres) has reached a peak rate of production by flooding. It is apparent already that this project will be a success, but it is much too early to predict the outcome of the others from their performance

(Continued on page 92)

*The term "secondary recovery" as used in this report is understood to include vacuum as well as gas-injection and water-flooding operations.

*The term "repressuring" is used in this report in the broad sense in which it is commonly applied in the industry. The repressuring operations in Weber pool actually are gas drives in which gas is injected into selected "key" wells and vacuum is applied at the producing wells.

†The term "gas" as used in this section of this paper is understood to mean the air-gas mixture from well casing heads.

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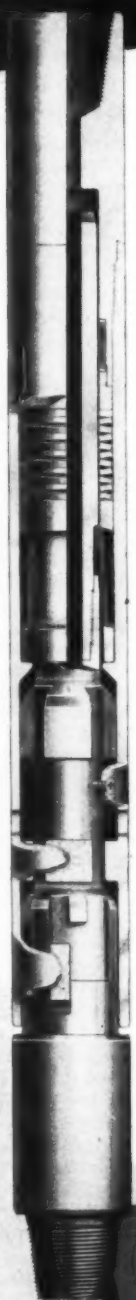

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Drive keys remain in locking slot as the blow is struck

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- Only 1/6th turn is needed to release the Safety Joint, eliminating risk of unscrewing other threads in the string.
- Until the Safety Joint is first made ready to release, *any* amount of torque—in *either* direction—can be applied through it without danger of release.
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NATURAL-GAS PROCESSING

. . . A review of its history, and a resume of current developments

by V. E. Middlebrook*

THE presence of gasoline in natural gas was first discovered in the early 1880's when operators of natural-gas transmissions systems experienced trouble with condensation in the lines. It was soon apparent that the condensed material was gasoline and drip pots were installed in line sags to accumulate and remove the product which, of course, reduced line capacity. Since there was no market for the product as motor fuel, it was usually burned as waste. About 1903 small quantities of the so-called "drip" gasoline were collected in barrels and marketed in the vicinity of Parkersburg, W. Va., for blending purposes.

*Consultant, Tulsa. Presented at A.I.Ch.E. meeting, Tulsa, October 1950.

Since the early days processes for recovery of the heavier paraffin hydrocarbons from natural gas have progressed through interesting phases of evolution from the advent of the simple low-pressure compression unit during the year 1904 and the low-pressure oil-absorption plant a few years later, to the intricate oil-absorption plants of today.

In 1918, the charcoal-adsorption unit was conceived and the first commercial plant was built in 1920 by United Natural Gas Co. of Oil City, Pa. By 1923, 8 charcoal plants were in operation and 10 in various stages of construction. A charcoal plant to process some 1,500,000 to 2,000,000 cu. ft. of 3-gal. gas cost about $130,000 at that time. A similar plant today would probably cost about $400,000.

Essentially, these units consisted of three adsorption towers packed with charcoal. While one tower was being used for adsorption, the gasoline was being stripped from a second unit with open steam and a third was being cooled in preparation for resuming the cycle. The cumbersome batch-type operation coupled with deterioration and loss of charcoal overhead resulted in the process being relatively short lived. In this connection, the new hypersorption process now couples the inherent advantages of selective charcoal adsorption with a continuous cycle in which the charcoal contacts the gas countercurrently by passing down the adsorption tower in a manner analogous to the oil absorption process.

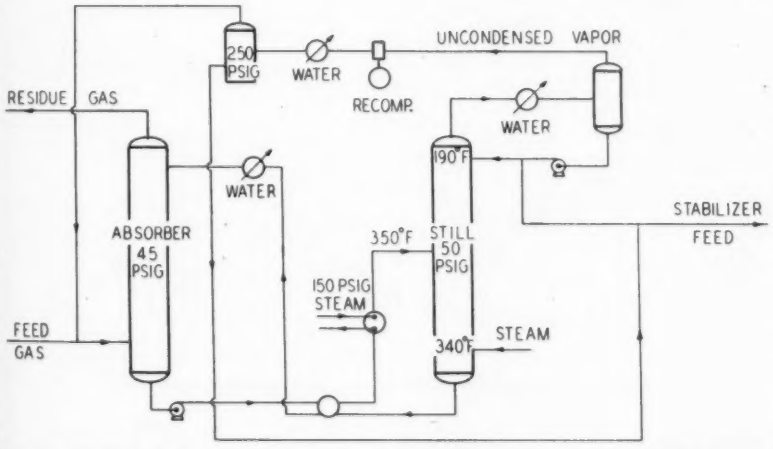

Fig. 1—Low-pressure oil absorption plant, 90 to 95 per cent isopentane and heavier recovery.

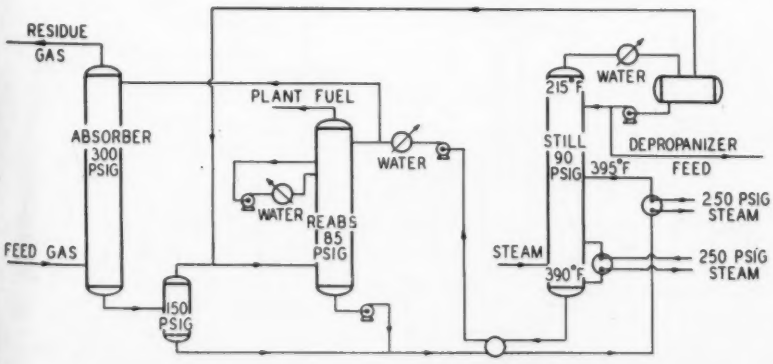

Fig. 2—High-pressure stripper operation, 90 per cent total butane recovery.

Many Variations Available

Today we have many variations of the highly complex oil-absorption units, the process selected being dependent principally upon the per cent recovery of butane and propane desired. Since complexity in any manufacturing operation can be justified only by increased efficiency coupled with new and improved products, and hence greater net returns, it might be interesting to discuss briefly the development of some of the more important process cycles, expected recoveries and relative investment costs which have contributed to the highly competitive situation which prevails in the industry today.

It should be remembered that in the modern plant the owner is not simply interested in improved products and greater recoveries at minimum investment and operating costs but also in sufficient process and mechanical flexibility to permit him to satisfy customer demands for widely varying grades of gasoline and L.P.G. mixtures.

Fig. 1 is a simplified diagram of a conventional low-pressure oil-absorption plant in which the rich gas is compressed through a single stage from atmospheric pressure to 45 psi. for contact with the absorption oil.

Recovery of 90 to 95 per cent of the isopentane and heavier constituents could normally be expected with these units along with sufficient butanes to make a 26-lb. product. With

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average-size field gathering systems handling 40,000,000 to 60,000,000 cu. ft. of gas daily, these plants were constructed in 1928 at costs ranging between $500,000 and $1,000,000. Residue gas remaining after fuel and extraction losses was usually burned through a plant flare line.

With the development of seasonal butane markets the process engineer was confronted seriously, for the first time, with the many problems associated with primary absorption and retention of desirable components while eliminating the unwanted lighter constituents which were unavoidably absorbed.

Fig. 2 shows the essential elements of a plant designed to recover 90 per cent of the total butanes. It was completed in July 1942 at a cost of slightly under a half million dollars. Total gas processed was 20,000,000 cu. ft. daily. Since the residue gas was to be sold to a utility company at 275 psi., absorption pressure was established at 300 psi. Of considerable interest in those days was provision for intertray cooling of the partially enriched absorption oil.

Intertray Cooling

In this particular plant, intertray cooling was used only in the reabsorber where the average absorption temperature would otherwise have been prohibitive due to the high latent heat given up by reabsorption of large quantities of butane. Water was used to cool the oil prior to returning it to the column to complete the absorption cycle. In many similar plants, propane refrigeration was used instead of water thus taking advantage of greater mean temperature differences and attainable low absorption temperatures.

It will be noticed that oil stripping was accomplished in a single still operating at 90 psi., using 250-psi. steam in a reheater at the base. By maintaining a bottom temperature of about 390° F., adequate stripping was effected with only 0.17 lb. of stripping steam per gallon of lean oil circulated. The high still pressure not only accomplished maximum liquefaction of the net overhead product (about 70 per cent condensed) but permitted the reabsorber to operate at a favorable pressure. Thus, in a relatively simple manner, most of the methane and ethane and some of the propane were eliminated from the process cycle while retaining nearly all of the butanes and heavier constituents. Only a 40-lb. R.v.p. product was manufactured which was injected into a crude-oil line for transport to a refinery.

The rapidly expanding butane market together with nominal demands for propane in 1940 heralded the use of numerous dual stripping operations. The fundamental principle of two-still operation is to accomplish partial stripping of the relatively light hydrocarbons from the enriched absorption oil in a primary column operating at some 150 to 200 psi. with final removal of the heavier components in a secondary unit operating at 45 to 60 psi. Since only low-vapor-pressure heavy hydrocarbons are stripped from the oil in the secondary unit these constituents can be totally condensed.

The totally condensed heavy material is usually pumped from the low-pressure accumulator into the high-pressure condenser where it mixes intimately with the lighter hydrocarbons to aid condensation of these constituents. Thus complete stripping of the rich oil can be effected with a reasonable amount of steam and in a manner which permits final accumulation of all the hydrocarbons at relatively high pressure, which accomplishes maximum liquefaction.

The plant represented by the process flow diagram shown in Fig. 3 was designed to handle 50,000,000 cu. ft. daily of casing-head gas and recover 45 per cent of the propane along with substantially all of the isobutane and heavier constituents. It was completed in 1940 at a cost of about $2,500,000, including field gathering system. The original design of the main absorber provided for intertray cooling as a means for increasing propane recovery. In 1948 a refrigeration system was installed and by lowering the oil temperature to 50° F., propane recovery was increased to 60 per cent.

It is well to mention here, that point of application of refrigeration in an absorption system is highly important from the standpoint of attainable efficiency. For example, the practice of chilling the lean oil prior to its entrance to the absorber results in considerable refrigeration loss due to low exit temperature of the residue gas. By chilling the partially enriched oil intertray the cold residue gas lowers the temperature of the entering lean oil and maximum refrigeration is accomplished.

In some plants this trend is emphasized by using two absorbers in series which, in effect, is the same as intertray cooling as the partially enriched oil from the base of the secondary absorber is chilled before pumping it into the top of the primary unit. Chilling of the lean oil prior to absorption, however, can be justified in cases where it is expedient to use a very low molecular weight (150 to 170) absorption oil. In such cases loss of the light absorption oil overhead

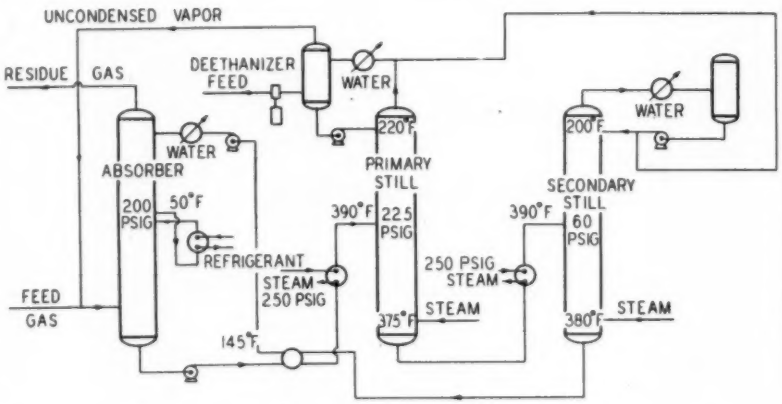


Fig. 3—Dual still operation, 90 per cent propane recovery.

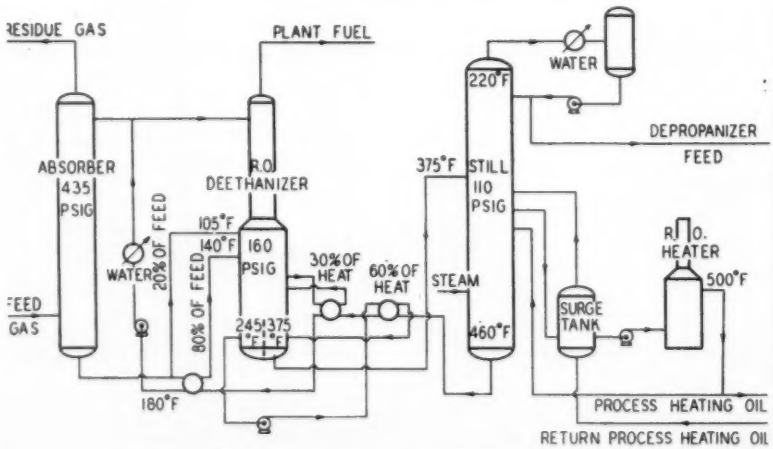


Fig. 4—Rich-oil deethanization, 70 per cent propane recovery.

is reduced while realizing the cogent advantages of a low-molecular-weight oil.

With the demand for higher propane recoveries as early as the latter part of 1943, the so-called rich-oil stabilizer made its appearance as an innovation in the natural gasoline industry although it had been used a number of years prior to that time in some refineries.

Fig. 4 shows the distillation unit for a plant designed to recover 70 per cent of the propane. The gas is compressed through three stages to 435 psi. for primary absorption. Rich oil from the main absorber is fed to a rich oil deethanizer, 80 per cent of the feed being heated to 140° F. by heat exchange with the lean oil, the remaining 20 per cent being fed cold. This arrangement permits flexible control of heat input to the central section of the column.

By heat exchange with the hotter lean oil ahead of the feed exchanger about 30 per cent of the total heat to the column is introduced at a point five or six trays above the bottom. About 60 per cent of the heat is delivered into the bottom of the column by exchange between the hottest lean oil from the still and the rich oil from the bottom tray. The deethanized rich oil is fed to a single still which operates totally condensing at 110 psi. Overhead product from the depropanizer is 95 per cent purity commercial propane.

A split stream of partially denuded rich oil, taken intertray from the still furnishes heat necessary for fractionator reboilers after being raised to 500° F. in a direct-fired heater. The required quantity of rich oil is simply diverted from the main preheated stream before it reenters the still for circulation through fractionator reboilers.

Two Chief Advantages

This system has two principal advantages over most integrated oil-heating arrangements. These are: (1) rich oil is used instead of lean oil which is conducive to greater over-all heat transfer rates due to lower viscosity of the former; (2) although it is an interlocked system, it is so arranged that quantities being circulated for heat input to various units permit entire flexibility of operation in that the heating oil, although a part of the process stream, is in parallel with the stream and is, therefore, independent of the process cycle from the standpoint of control.

It should be remembered that any system which employs hot oil for process heating instead of steam, does so by supplying sensible rather than latent heat. Further, the temperature of the oil and hence the mean temperature difference must be higher than would be necessary by using steam in order to compensate for lower over-all heat-transfer rates. Finally, temperature differential of the oil, which determines the quantity to be circulated, and pressure drop across heat-exchange equipment, must be balanced carefully so that minimum pumping horsepower and heat-exchanger surface will be required.

An alternate process heating system is the use of Dowtherm, a chemical which supplies latent heat at a higher temperature level than does steam. The advantages are: higher over-all heat-transfer rates coupled with higher mean temperature differences and hence minimum heat-exchange surface requirements.

It will be noticed that since the rich oil is deethanized, only one still is required which operates totally condensing thus requiring no recompressor. Further, no final deethanizing product fractionating column is needed. This plant was constructed in 1949 to handle 25,000,000 cu. ft. per day of casing-head gas at a cost of approximately $1,000,000, exclusive of field gathering system.

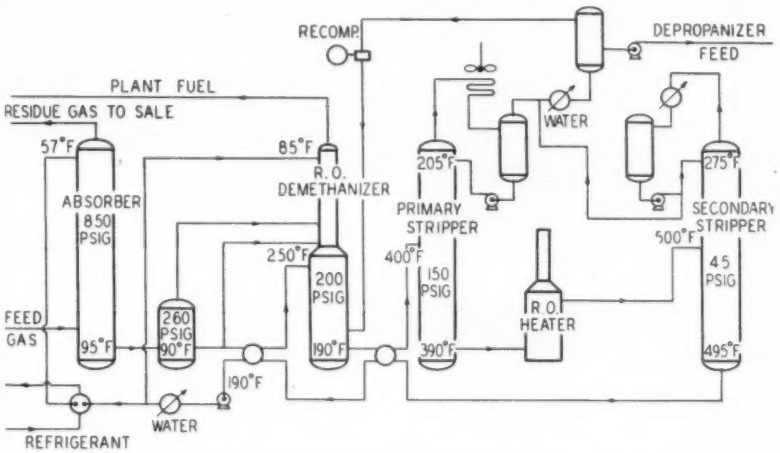


Fig. 5—Rich-oil demethanization, 90 per cent propane recovery.

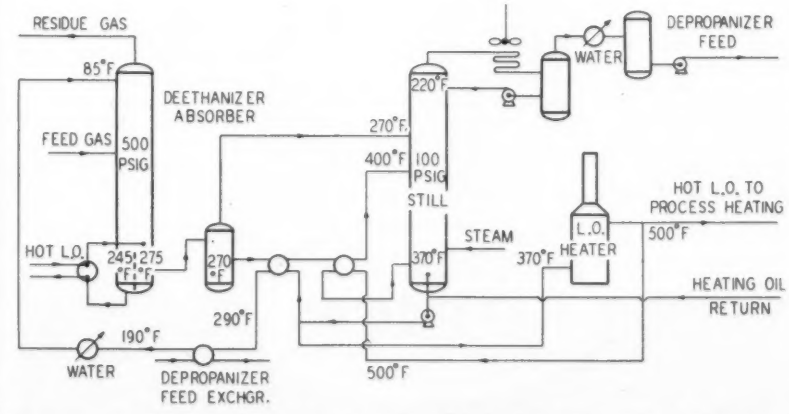


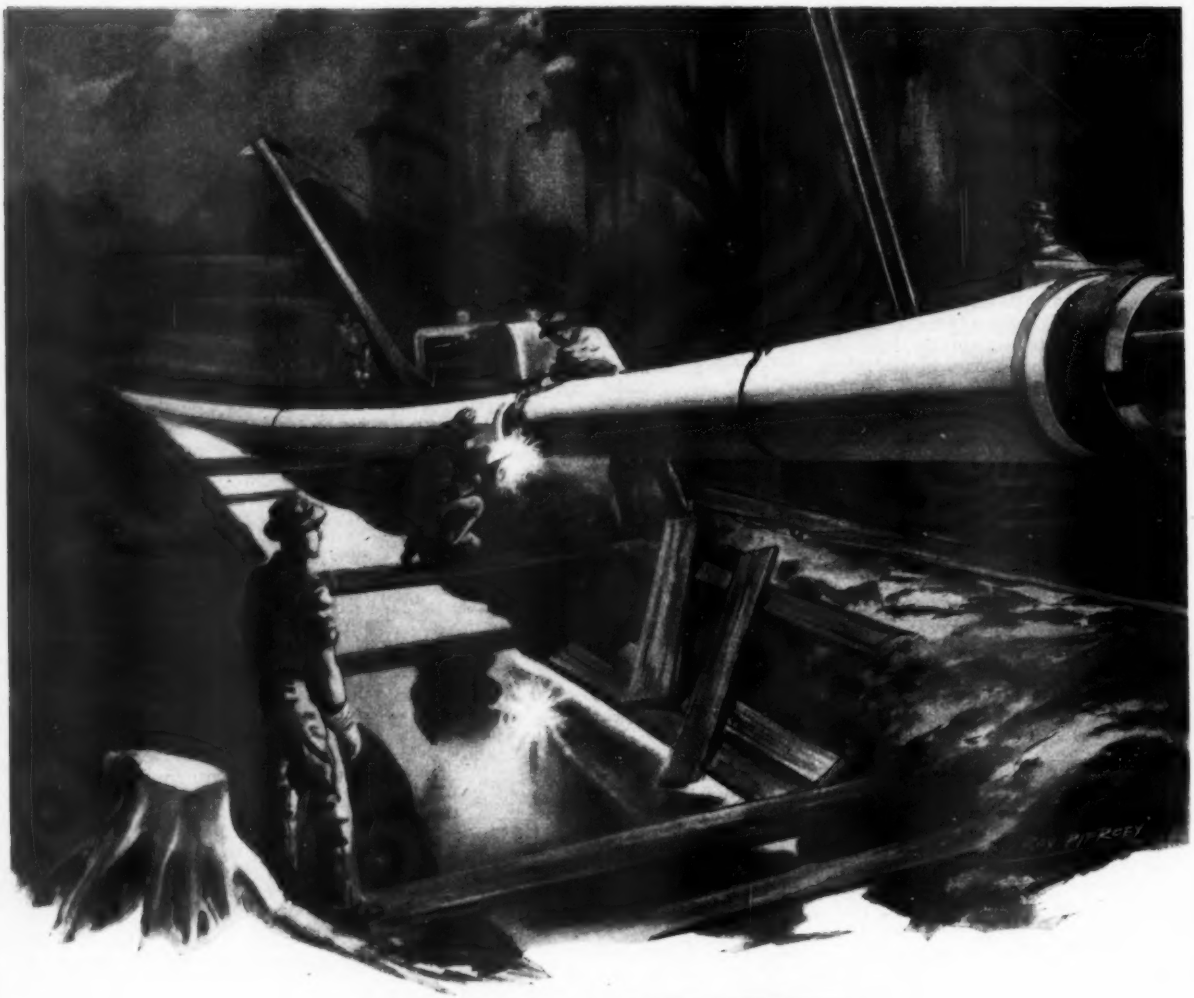
Fig. 6—Combination absorption and reabsorption and rich oil deethanization, 75 per cent propane recovery.

60,000,000 Cu. Ft. Per Day

The plant represented by the process flow diagram shown in Fig. 5 was designed to handle 60,000,000 cu. ft. of gas daily and to recover 90 per cent of the propane as 95 per cent purity product (85.5 per cent propane as propane). Absorption pressure is 865 psi. and the rich oil is demethanized in a column operating at 200 psi. Heat to the column is supplied only in the rich-oil feed by heat exchange with lean oil from the secondary still.

Since only the methane and some ethane have been removed from the rich oil in the demethanizer, both a primary and secondary still are required. Further, as total condensation cannot be accomplished in the primary unit, due to a relatively large amount of ethane in the overhead material, a recompressor is required to handle the uncondensed vapor which is fed hot after compression into the demethanizer to aid partial stripping of the rich oil. Finally, a conventional deethanizing product fractionating column is required to recover commercial propane. The feed to this unit is essentially bicomponent since it is the overhead ethane and propane from the depropanizer which

(Continued on page 107)



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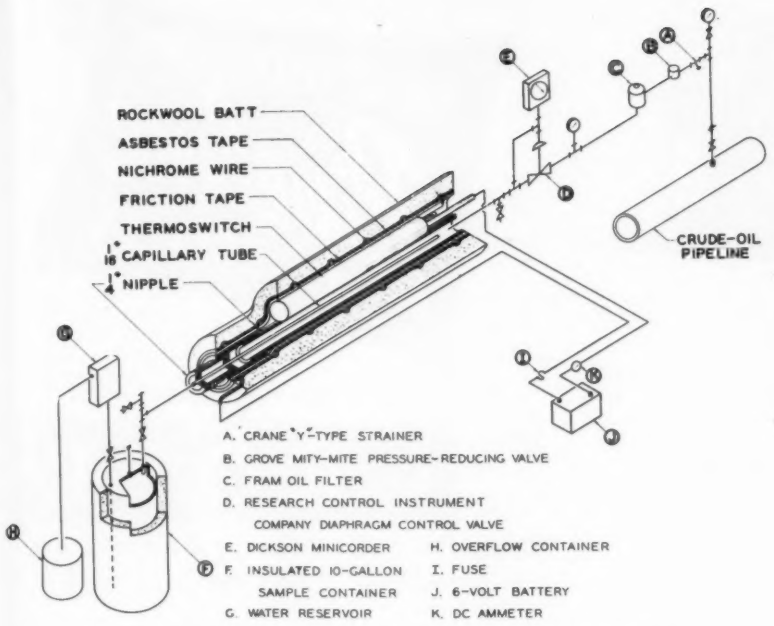

Fig. 1—Schematic arrangement of automatic sampler for pipe lines.

Portable Automatic Sampler

This special-purpose device has been designed to take series of samples throughout a large pipe-line system

by W. E. Roads*

KNOWLEDGE of certain physical and chemical characteristics of crude oil is essential to the efficient movement of crude oil via pipe line. Properties such as gravity, viscosity, vapor pressure, sulfur and hydrogen sulfide content, and b.s. and w. content directly affect pipe-line operations. But before any of this information can be determined, it is necessary first to procure a representative sample of the particular crude in question. Due to stratification within crude-oil storage tanks, the test samples are best obtained from a sample connection on the pipe line, where a small portion of the crude can be bled off as it flows past the sampling point.

The ideal representative sample would be a continuous one whose rate is directly proportional to the rate of flow through the pipe line, and whose constituents, and percentages thereof, are exactly the same as those of the crude in the flowing stream. This ideal sample would be collected and stored at line pressure. Samples which approach the ideal may be obtained either manually or automatically, each method having its particular application.

*Engineer, Service Pipe Line Co., Tulsa. Summary of paper presented at A.S.M.E. meeting, New Orleans, September 1950.

Manual sampling is satisfactory in cases where the sampling period is of short duration, or where there are only slight variations in the characteristics of the flowing crude. This type sampling is also used to detect the interface between adjacent batches of crude oils. For this purpose sampling at frequent intervals is started slightly in advance of the scheduled arrival of the new batch. The gravity of each individual sample is immediately determined by means of a hydrometer—a significant change in gravity being an indication of a batch change.

Automatic Sampling

For most other purposes automatic sampling is preferable to manual sampling from the standpoint of the reliability of results obtained from various tests run on the sample, since automatic sampling usually provides a more nearly representative sample than does manual sampling. There are a number of automatic samplers on the market which can be connected to a positive-displacement meter such that a definite quantity of sample is taken per unit volume of oil flowing through the meter; thus collecting a sample which is proportional to the flow rate through the pipe line. The quantity per unit volume may be varied at the discretion of the user.

If a positive-displacement meter is not available, these same samplers may be connected through an electric time-cycle controller, thus taking a constant-rate sample. Only where the rate of flow through the pipe line is essentially constant, will constant-rate sampling give truly representative samples. Most of these samplers are of the intermittent type; that is, they take small "slugs" of oil during a short period of their cycle, and take no sample at all during the remainder of the cycle.

The automatic sampler discussed here is a special-purpose device, designed to take a series of samples throughout a large pipe-line system. These samples were to be taken at small field gathering stations and at junctions where field lines inject into main trunk lines, as well as at trunk-line pump stations.

Requisites Considered

The following requisites were considered in the development of this special purpose sampler:

1. Some samples would be taken at locations where neither electricity nor compressed air is available; consequently, the device must be completely self-contained—relying on no external source of power for its operation.

2. Sample periods of from 1 week to 1 month were anticipated. The size of the sample container had been established at approximately 10-gal. capacity; this required sampling rates of from 1 to 4 cc. per minute.

3. The samplers were to be used on a system-wide basis, so they must be portable and easily installed. A unit would remain at a particular location for a maximum of 30 days, after which it would be shipped to another sampling point.

4. Samples would be taken from the pipe line at various pressures—the pressure varying from about 10 psig. in some cases to as much as 1,000 psig. in others.

5. Water-displacement sampling had been specified.

6. The nature of the data to be obtained from the samples was such that constant-rate sampling would suffice. In the majority of applications the rate of flow through the pipe line would be essentially constant; therefore constant-rate sampling would give representative samples.

Original intent was to connect the oil-inlet side of the sample container directly to the sample tap on the pipe line, and to control the flow of water from the container—assuming that 1 cc. of crude oil would enter the container to replace each cc. of water that was displaced. Control on the water-outlet side would be obtained with a pressure-reducing valve, a diaphragm control valve, and a flow-control needle valve. This arrangement would keep the sample at line

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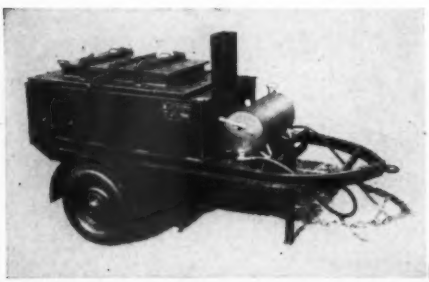

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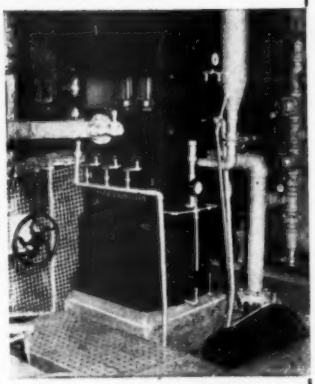

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pressure and prevent vaporization of the light ends in the crude. However, the sample container must withstand full line pressure, resulting in a very heavy and expensive container for 1,000-psig. operation.

To save weight and cost of fabrication the sample containers were designed for a working pressure of 50 psig., necessitating pressure reduction between the pipe-line connection and the sample container. To insure satisfactory operation of the pressure-reducing and pressure-control valves, filtering of the crude would be required. Filtering would remove a portion of the b.s. content from the sample; however, this was not considered objectionable since b.s. determinations were not of primary interest in the crude analysis to be made.

Fig. 1 shows the special sampler in its final form. Ten of these units have been fabricated and put in service; and, although no definite performance data are yet available, it is felt that the samplers are operating well within 10 per cent of their set rate.

The flow rate through the capillary tube will remain constant as long as dimensions of the tube, pressure drop across it, and viscosity and gravity of the flowing crude oil all remain constant. This is the principle on which the sampler operates. Maintaining a constant temperature within the capillary tube holds its dimensions constant, and also keeps the viscosity and gravity of the same crude constant, provided these two characteristics of the crude flowing through the pipe line do not vary appreciably. Maintaining a constant controlled pressure on one side of the capillary tube and atmospheric pressure on the other side provides a constant pressure drop across the tube.

Limitations of Sampler

As with all other pieces of mechanical equipment, this sampler has certain limitations, and must be operated within them. These limitations are:

1. B.s. and w. determinations cannot be made due to the required filtering of the crude, and the water-displacement method of collecting the sample.
2. A portion of the light ends in the crude is lost to the atmosphere because of continued venting. These light ends are vaporized due to pressure reduction and the addition of heat. The seriousness of this loss is questionable, since the majority of these vapors would probably be lost in tankage anyway.
3. Marked variations in the viscosity of the crude oil flowing through the pipe line will cause appreciable variations in the sample rate.
4. Since for a given crude the sample rate is essentially constant, the composite sample thus obtained will be proportional to flow rate only when the rate of flow through the pipe line is constant.
5. Adjustments for large variations in sample rate are difficult to make. A major change in sample rate necessitates a change in the length of the capillary tube, or the installation of a different diaphragm spring in the control valve, either of which is a rather difficult job.

On the other hand adjustments for slight changes in sample rate are comparatively easy to make. A change in the tension adjustment of the spring in the diaphragm control valve is all that is necessary. Changing the temperature setting of the Thermoswitch wil change the sample rate, but this method is not recommended. The Thermoswitch should normally be set at whichever of the following temperatures is the highest:

a. The lowest temperature at which it is certain that all the paraffin in the crude oil will remain in solution.

b. The maximum temperature that the sampler piping is likely to reach during the hottest part of the day.

Using the highest of these two temperatures prevents paraffin accumulation, assures constant temperature operation throughout the sampling period, and prolongs the battery life, which at best is about 2 weeks. Higher temperatures than this cut battery life drastically and increase evaporation losses.

To offset these limitations the sampler has the following features:

1. It is portable, easily fabricated, and easily installed.
2. It is completely self-contained, requiring no external connections to a source of power. This allows sampling at any location where the crude oil is flowing under pressure.
3. The sampler continuously bleeds crude oil from the pipe line; thus a small portion of all the crude flowing past the sample connection is collected in the sample container. Continuous automatic sampling has a slight theoretical advantage over intermittent automatic sampling.
4. It is adaptable to taking very small samples over comparatively long periods of time. It operates satisfactorily at sample rates as low as 1 cc. per minute.
5. All component parts which are required for its fabrication are readily available.

A slight change in design would make b.s. determinations possible This would involve the removal of the sample container from its present location in the sampler piping, and its insertion between the sample tap on the pipe line and the Grove pressure-reducing valve. With this arrangement only water would flow through the pressure-reducing valve, the diaphragm control valve, and the capillary tube; consequently filtering of the crude oil would not be required. This modification in design would eliminate the possibility of paraffin accumulating in the capillary tube. It would also eliminate variations in sample rate due to changes in the viscosity of the flowing crude. As was pointed out earlier, such an arrangement would require the sample container to withstand full line pressure.

The container should be well insulated to minimize changes in sample rate due to temperature change. Since the sample container would be at line pressure, it is felt that the quantity of accumulated vapors would be negligible.

Marine Platforms For Offshore Drilling

(Continued from page 77)

the manner shown in Figs. 2 and 3. The column portions of the braced bent rest in and are clamped securely in the engaging devices at the end of the shaft, which is free to rotate. The braced bent is towed in this position with the base sections afloat.

After the barge and braced bent have been towed to and positioned over the platform site, the base sections are gradually filled with measured amounts of water, causing them to sink and rotate and the bent to assume a vertical position as indicated by the dotted portion of Fig. 2. After it has reached a vertical position as verified by clinometers and while it is maintained in this position by the control lines shown, the clamps are released to permit sliding movement of the column sections through them. Flooding is resumed until the bases rest on bottom.

Use of Water Jets

To facilitate sinking of the caisson bases through silt or other unsuitable material to a firm foundation, two sets of water jets are used. One set, staggered in two rows around the outside vertical surfaces of the bases at one-third and two-thirds height respectively, is for lubrication of the caisson walls during sinking operations. These jets are most effective and trouble-free if positioned at right angles to the wall surfaces.

If the caisson base is to be sunk through considerable depths of material, compressed air is introduced at the water jet nozzle to assist further in reducing skin friction. The second set of jet nozzles is located around the periphery and inside the cutting edge of the caisson base and is used to flush the soft materials to a pump suction at the center of the base, whence they are ejected up through the center tube in the caisson pier column. After the caisson pier bases have been seated on firm material in a plumb position in both planes and at the required elevation, the cone-shaped cavity under the base is filled with rammed gravel and a tremie placed concrete plug.

To space and position the second and subsequent frames accurately with respect to the frame or frames already in place, the barge with the next frame is moved to and held in contact with the columns of the frame already in place by means of the positioning outriggers shown in Figs. 3 and 4, thus assuring accurate spacing of the braced frames. While held firmly in this position, flooding of the bases, jetting, pumping, and filling are carried on as before until the additional frame is at the required level and position. In greater water depths, to avoid interference the frame to be placed is rotated before the barge is moved into contact with the frames already in place. Bracing girders are then placed connecting the two frames at the caisson pier points. The template barge is disengaged, and any additional bents are placed in the same manner.

When all bents are in place, the superstructure may be placed. This is usually done in large prefabricated sections, sometimes with operating

equipment secured in place and ready to function.

This method of expeditiously and accurately placing caisson pier bents is illustrated with a two-pier frame, but it can be similarly employed for three-pier bents or for a greater number if desired. The method and special equipment were developed primarily for the construction of marine platforms and have been patented.

The marine platforms are applicable to other structures in the petroleum industry and in the construction industry. For example, for use in overwater stock-tank storage at a central collection point from which oil can be piped or barged ashore. For such use it would be advisable to design and build almost wholly in precast concrete for better fire protection. Applications in the construction industry would include bridge piers or causeways in deep water, and offshore structures in the open sea, such as lighthouses, direction finder and loran stations, recreation pavilions, and anchorages for ship-to-shore conveyors and cableways.

Water Flooding In Weber Pool

(Continued from page 83)

alone. Information assembled by the Bureau of Mines in the study of Weber pool indicates, however, that the field as a whole should respond favorably to flooding.

The sand conditions in the oil reservoir, including porosity, permeability, unconformity in composition, and presence of free water, are of major importance in the success or failure of a water-flood operation. The porosities and permeabilities of the Bartlesville sand in Weber pool are comparable to those of Bartlesville sand in other areas that have been water flooded successfully. One of the most important factors is the uniformity in permeability of the oil sand. If the sand is of fairly uniform permeability, the injected water will flood the entire sand body and will not "bypass" through thin beds of shale and coal or "channel" excessively through zones of high permeability.

Analyses of cores from the Bartlesville sand in Weber pool show some sections of high permeability. These "loose" sections, however, are not continuous and could not be correlated from one well to another. Apparently there is not a continuous permeable layer over any appreciable area in Weber pool. In some places a thin layer of coal lies immediately above the oil sand, which might fracture and act as a "bypass" for the injected water if subjected to excessive injection pressures. This possible trouble can be avoided by setting the casings (or tubing, if casing is not used) in the injection wells below the coal streak. There also is a possibility of water bypassing through a so-called "black sand"* section usually found in Weber pool at the base of the Bartlesville sand.

Apparently, when Weber pool was developed originally, little or no free water was in the Bartlesville sand, because wells in the pool have never produced an appreciable amount of water. In recent years, however, some wells have been drilled in areas that contain considerable water in the oil sand. It is believed that these areas have been "flooded" or "watered out" through old abandoned wells that were improperly plugged, permitting water from upper formations to migrate down into the Bartlesville sand. The watered-out areas could not be water flooded profitably and should be considered in planning the well pattern for a flood. Injection wells usually are located in such areas to drive oil to surrounding oil-producing wells.

Although no part of Weber pool has been intensively repressured the reservoir has responded favorably to gas injection. This favorable response is an indication that the reservoir should respond favorably to water flooding. Some operators are of the opinion, however, that the application of vacuum along with gas repressuring may have created channels between injection wells and producing wells that would be detrimental to water-flooding operations. Most of the properties being successfully water flooded in Kansas and Oklahoma, however, have been subjected to vacuum and gas injection.

The availability of a large water supply is essential for water flooding. As adequate surface water to provide a dependable supply is not available in the vicinity of Weber pool, subsurface water must be used. Water is present in the Oswego and Mississippi limestones and other formations above the Arbuckle group, but these formations will not supply enough water for water flooding. The only reliable source of water in the Weber pool is the Arbuckle, the top of which is at a depth of approximately 1,750 ft.

The top 200 ft. of the Arbuckle group is a porous dolomite that normally is a very prolific water-bearing formation. Where wells do not find an adequate supply of water in the upper porous dolomite section, they may be drilled deeper to the Roubidoux sand and obtain an adequate water supply. The finding of a highly prolific water-bearing formation at depths below the water sand of the Arbuckle group is questionable, but it appears unlikely that it will be needed.

*The sand is not to be confused with the asphalt-saturated sand occurring at the base of the Bartlesville sand in many fields in Oklahoma and Kansas. Laboratory tests indicate that some oil can be recovered from the black sand in parts of Weber pool.

Ordinarily, water from the Arbuckle in northeastern Oklahoma and southeastern Kansas contains hydrogen sulfide and requires some degree of water treatment before being used in a water-injection system. Tests made on the water from a supply well in the SW¼ 27-27n-13e, producing from both the porous dolomite and the water sand sections of the Arbuckle group, showed no hydrogen sulfide present. A number of water-treating and conditioning problems are eliminated by the absence of hydrogen sulfide.

The first requirement for the success of any water-flooding operation is the presence of adequate recoverable oil in the formation to be flooded to pay developing and operating costs and provide a margin of profit. Calculations by the pore-volume method indicate that the Weber pool reservoir originally contained about 12,000 bbl. of recoverable stock-tank oil per acre, or 510 bbl. per acre-foot of sand. About 5,300 bbl. of oil per acre, or 227 bbl. per acre-foot had been produced to January 1, 1950, which leaves an average reserve of approximately 6,700 bbl. of recoverable oil per acre, or 283 bbl. per acre-foot. Determinations of the oil saturation of cores taken from wells throughout the pool indicate that the recoverable oil saturation is somewhat less than calculated. The analyses of cores taken with wireline core barrels show recoverable oil reserves of 3,000 to 5,000 bbl. per acre.

A core taken with the recently developed Electrodrill was found to contain about 9,200 bbl. of recoverable oil per acre. Although the estimates of recoverable oil reserves by the pore-volume method may be high, it is believed that the application of water flooding should result in the recovery of an average of 5,000 bbl. of oil per acre.

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1. Bass, N. W., Leatherock, Constance, Dillard, W. R., and Kennedy, L. E., Origin and Distribution of Bartlesville and Burbank Shoestring Oil Sands in Parts of Oklahoma and Kansas, Bull. A.A.P.G., Vol. 21, No. 1, Jan. 1937, pp. 30-66.

2. Blachley, Raymond S., Waste of Oil and Gas in the Mid-Continent Fields, Bureau of Mines Tech. Paper 45, 1913, pp. 1-54.

BOOKS

GROUND-WATER RESOURCES OF THE VALLEY-FILL DEPOSITS OF ALLEGHENY COUNTY, PENNSYLVANIA. By J. H. Adamson, Jr.; J. B. Graham, and N. H. Klein. Published by the Pennsylvania Geologic Survey, Harrisburg. 181 pp.

This report presents a fairly complete inventory of municipal and industrial wells, and describes the utilization of ground water from the highly productive unconsolidated sediments partially filling the valleys of the major rivers in the county. In addition, data on fluctuations of groundwater levels, well logs, chemical analyses of well water, and profiles and maps relating to the valley-fill sediments are presented.

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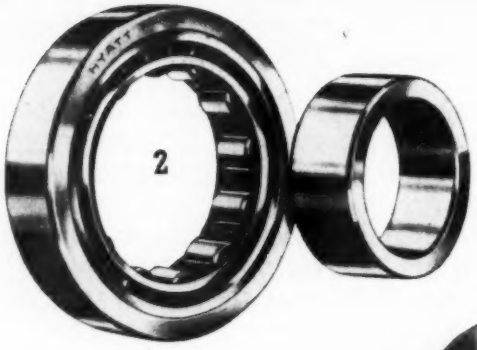
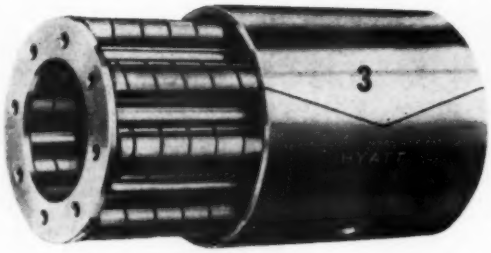


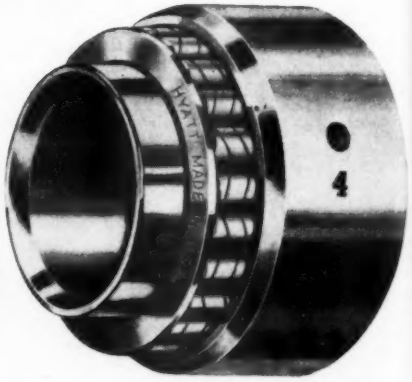
1. One-piece roller bearing.

2. Two-piece roller bearing.

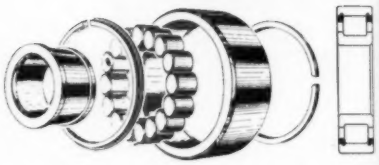
3. Two-piece helix-wound roller bearing with split race.

4. Three-piece helix roller bearing.

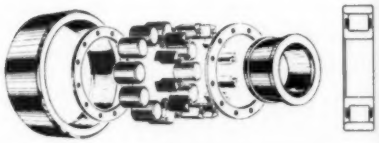




Selection, Care, Installation of Antifriction Bearings



Exploded view showing one-piece (full complement) roller bearing.



Exploded view showing components of a two-piece roller bearing.

by J. A. Trail*

IN general the rotary parts of industrial equipment operate with some type of antifriction bearing. There are many kinds of these bearings, all of which principally employ either cylindrical or spherical shapes, or combinations, and also conical elements. These transfer the loads from rotating shafts and wheels to their supports. The cylindrical, spherical, or ball-type element functions to provide such load transfer with minimum friction.

There are several types of ball bearings in regular manufacture. First, let us take the single-row type. This bearing is composed of an inner race, outer race, and a set of balls inserted between the two races. Usually, there is a cage, or separator, which spaces the balls. This bearing may have closure seals and other devices for adapting the bearing to particular uses.

The single-row bearing can be made up as a deep grooved race bearing which is assembled by placing the inner race eccentrically in the outer race and inserting the required number of balls which when spaced evenly by the cage provides the proper clearance between the bearing elements.

Another of the one-piece single-row types is the notched race bearing. Both the inner race and outer race have notches on the same side which when aligned allow the introduction of the balls and the cage, thus completing the assembly. The notches in the races reduce the thrust capacity of this type of bearing.

The single-row bearing can be made up as an angular contact type which can be either one-piece bearing or separable into three pieces. Example of the latter is the three-piece angular contact ball bearing used in front wheels of some automobiles. This bearing takes both radial and thrust loads but thrust in only one direction. Such condition of loading requires two such bearings for two-directional thrust.

We then note that the ball bearing is made up as a double-row one-piece bearing which can be of the deep-groove type or the notched-race type. The double row can also be made up of the angular contact type which can be separable in matched sets or one-piece bearing. There are several versions of the latter type which take thrust loading in either

*Sales engineer, Hyatt Bearings Division, General Motors Corp.

IN CONNECTION WITH PROPER CARE OF BEARINGS NOTE THESE POINTS:

THINGS TO REMEMBER

1. Remove all outside dirt from housing before exposing bearing.
2. Treat and handle a used bearing as carefully as if it were a new one.
3. Work with clean tools in clean surroundings.
4. Handle with clean, dry hands or, better, clean canvas gloves.
5. Use clean solvents and flushing oils.
6. Place bearing on a clean paper surface.
7. Protect disassembled bearings from rust and dirt.
8. Use clean rags to wipe bearings.
9. Keep bearings wrapped in oilproof paper when not in use.
10. Clean inside of housing before replacing bearing.

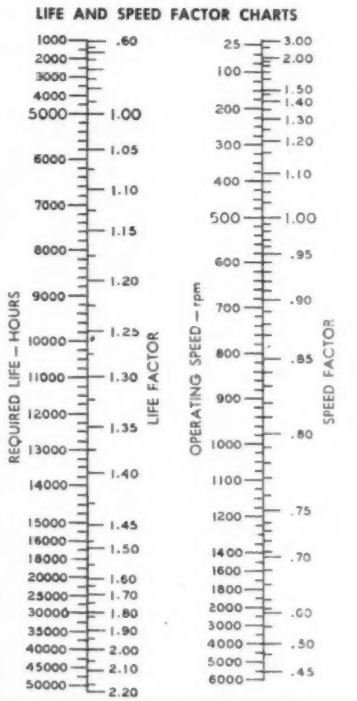
THINGS TO AVOID

1. Working in dirty surroundings.
2. Using dirty, brittle or chipped tools.
3. Using wooden mallets or working on wooden bench tops.
4. Handling with dirty, moist hands.
5. Using gasolines containing tetraethyl lead.
6. Spinning uncleaned bearings.
7. Spinning bearings with compressed air.
8. Using cotton waste or dirty cloths to wipe bearings.
9. Exposing bearings to rust or dirt at any time.
10. Scratching or nicking of bearing surfaces.

direction along with radial loads. Thrust ball bearings are made to take two-way thrust.

The double-row ball bearing is manufactured with spherical outer races and double-groove inner races for installation where self-alignment is required.

With exception of the three-piece angular contact and the various thrust ball bearings, the bearings mentioned have correct running clearance within the bearing when properly assembled on a shaft and in a housing.



To select a bearing having any required life other than 5000 hours, find the Life Factor corresponding to the required life from the chart above, and multiply the applied load by this factor. Then consult the Load Rating Tables to find a bearing having a rating equal to or greater than this figure.

The Load Rating for any speed is found by multiplying the rating for 500 rpm by the speed factor obtained from the above scale.

"Average" life chart.

The others require use of shims or adjusting nuts, and washers with cotter pins or lock nuts.

Due to type of contact between the balls and the races, ball bearings have capacity for relatively high rotative speeds but they should be carefully selected for certain types of loading.

The roller bearing, which has been commonly termed the work horse of antifriction bearings, like the ball bearing, is composed of an inner race, an outer race, and it can have a cage or be cageless. This latter arrangement is called a full-complement type. Roller bearings are manufactured in one-piece, two-piece, or three-piece types. When desired they can be applied without inner races with rollers running directly on the shaft, or reversed with the rollers running in the housing. Where the roller assembly is separable from both races, it can be run directly on the shaft and in the housing provided suitable hardness and finish are provided on the contact surfaces of the shaft and housing. This condition must be met when any one of the bearings is used where either race is omitted.

The straight roller bearing can be made either as a solid roller or a helix-wound roller. The latter is made by wrapping strip metal to the desired form, then hardening and grinding it as required. This type roller is primarily used in two or three-piece bearings.

Where there is an inner race with straight roller bearings it is always of solid material, but in some two-piece bearings the outer races can be made up with a full-length chevron-shape split.

Rollers other than straight cylindrical are made in shapes of an hour glass, true barrel, and generated or tapered-barrel types. All three types can be made up as single-row separable two-piece bearings or as double-row one-piece bearings. All of these types are applicable in installations where shaft misalignment or deflection occurs.

The tapered roller bearing of the single-row type employs an outer race called the cup and an inner race with rollers and cage as one unit called cone-and-roller assembly. The rollers are true truncated cones which make line contact with both races.

There are many versions of the tapered roller-type bearing. It can be made up in single row or double row; adjustable or nonadjustable units. It can have a cage or be cageless. It can be made to take only thrust. All other versions will take combination radial and thrust loads.

Another type bearing, which in a strict sense may debatably be called a roller bearing, is the needle bearing. The rollers of this bearing derive their name from their proportions, since its diameter is usually very small in comparison with its length. The roller lengths are usually from 5 to 10 times their lengths. These bearings are not generally made with cages or roller separators, but are full-complement-type bearings with minimum circumferential clearance between rollers with possible exceptions in recent developments.

It was first thought that these bearings could be used only on relatively slow-speed or oscillating loads, but in recent years they have been used in relatively high to high-speed service. However, most of the high-speed applications are in small, lightly loaded shafts or in cases where the load reverses or where it may be directed at various angles around the shaft. Example of the latter is the connecting rod of some small internal-combustion engines where loose rollers are used. In such service, indications are that the rollers do not actually roll without slipping. It is thought that a wedge of lubricant collects between adjacent rollers and the rotating shaft and load is floated on these wedges. If this is the case, this type bearing probably operates more or less as a plain bearing at times.

The needle bearing is made usually

in one of three ways. It is manufactured as a three-piece bearing made up of an outer race, inner race, and a set of cageless rollers usually retained with the outer race by shoulders which extend over the teats of the roller ends. The second version is a one-piece bearing made of an outer race with rollers to be applied directly to the shaft. The third is roller units by themselves running directly in a housing or directly on a shaft.

Needle bearings are constructed to provide maximum radial capacity for minimum diameter in all cases.

Most all bearing manufacturers make bearings which conform to standards set up by the Antifriction Bearing Manufacturers Association, consequently most bearings are interchangeable as to nominal dimensions. However, inside-diameter and outside-diameter limits are such that frequently two different makes of bearings cannot be used interchangeably on the same shaft and in the same housings.

Occasionally, in the use of antifriction bearings, there arises a bearing requirement which cannot be met with regular standard production sizes and types of bearings. This condition may call for special sizes, or special types, or special internal clearances. Such bearings usually run higher in cost for a given weight of material than regular production bearings.

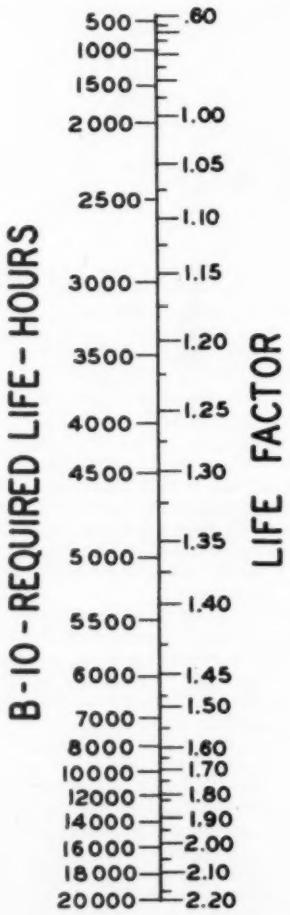
Bearing Selection

In selecting antifriction bearings for machinery, the designer is confronted with a mathematical as well as an economic approach to the problem, but before we get too involved in a mathematical approach to the proper selection of bearings let us say that experience plays a greater part in the selection of bearings than in any other phase of the problem. This is brought about by the fact that it is largely impossible in most cases to anticipate and to calculate accurately the loads in a given machine which the bearings may be called on to support.

Where we do know something about the expected loads, we select bearings based on the calculated maximum load that may be encountered. This load may occur during only 5 or 10 per cent of the life of the machine; consequently the bearings so selected are too large and expensive when compared to the over-all balance of a properly designed machine. If we take an arithmetical average, the bearings might be too small. It has been found that a more economical bearing is obtained when taking into account a weighted average load, based upon the root mean cube of the various loads and the length of time these loads are to be encountered. Such an approach to the problem involves the relation between the load capacity of the bearing and its fatigue life.

Most machines are designed for an approximate number of years of anticipated operation. This useful life varies with the machine and its use. Obsolescence of design and other factors may cause the machine to be relatively short lived when compared with another; therefore these factors should be taken into account when selecting bearings. For example, certain types of heavy stationary machinery may be expected to run 20 or more years at reasonably constant rates with more or less continuous loads and suitable maintenance. Selection of bearings under these conditions would be a relatively simple problem. Peak load and speed should be used for bearing selection for the required years of life.

Consider an item of machinery, which is used normally about 3 or 4 months out of each year. Its over-all life expectancy might be from 4 to 6 or at most 8 years. Consequently the bearings for such machinery should not be selected for an 8-year life at maximum load for continuous operation. If such was the case, expensive bearings would probably go to the scrap pile long before the end of their useful life had been reached.



Life factor chart.

The selection of bearings comes after the designer has arrived at the proper shaft size for supporting the rolling elements of the machine. In many cases shaft size determines bearing size, and for structural and assembly reasons the shaft size must be maintained. This is especially true where a shaft overhangs the bearing support such as with sprockets between two supporting bearings on a shaft in a chain transmission driven by an outside chain and sprocket.

In gear reducers where shafts are large for rigidity, their bearing may be much larger than required for loading conditions. In such cases the shaft diameter may be reduced at the bearing.

The principal factor which determine the size of the bearing are load, speed, and the required life of the bearing. The useful life of a roller bearing ends when some of its parts fail. Under clean and well-lubricated operating conditions, measurable wear which does not affect the performance of the bearing will occur only to a slight degree. Normal bearing failure occurs as pitting of the rolling surfaces, and is the result of fatigue failure in the material.

Fatigue may be defined as the gradual deterioration of a substance subjected to repeated or variable stresses. Experiment has demonstrated that for roller bearings, the relationship between applied load and the number of repetition of stress before failure occurs, can be approximated by the equation:

$$\text{Life} \propto \frac{1}{(\text{Load})^3}$$

In other words, if the load on one bearing is twice the intensity of that applied to another identical bearing, the life of the first bearing can be expected to be only one-eighth the life of the second.

The relationship between speed and life can perhaps be best understood by considering life as a measure of the number of cycles or repetitions of stress that a bearing is able to withstand before failure occurs. If these cycles are produced rapidly, that is, if the speed is increased, failure will occur sooner than if they are produced at a slower rate.

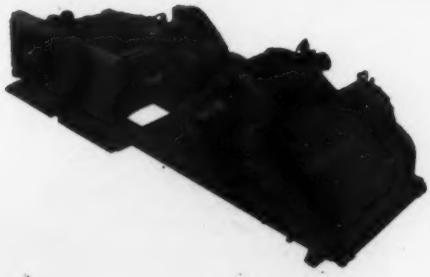
The relationship between life and speed can be expressed by the equation:

$$\text{Life} \propto \frac{1}{\text{Speed}}$$

The relationship between speed and load would then be similar to that between life and load, or:

$$\text{Speed} \propto \frac{1}{(\text{Load})^3}$$

To aid in selection of proper bear-



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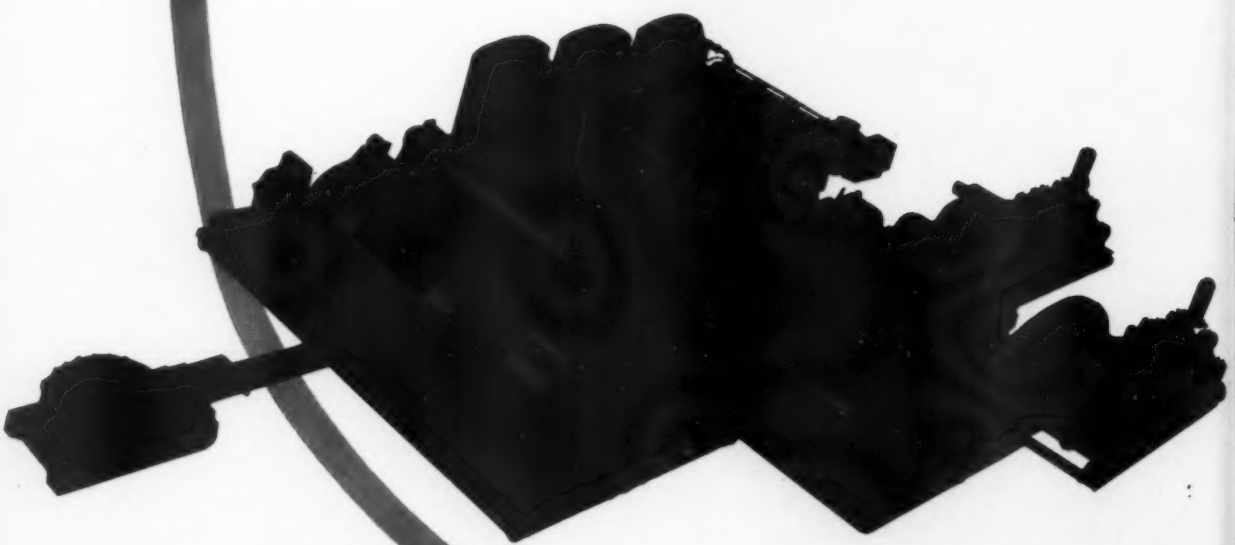

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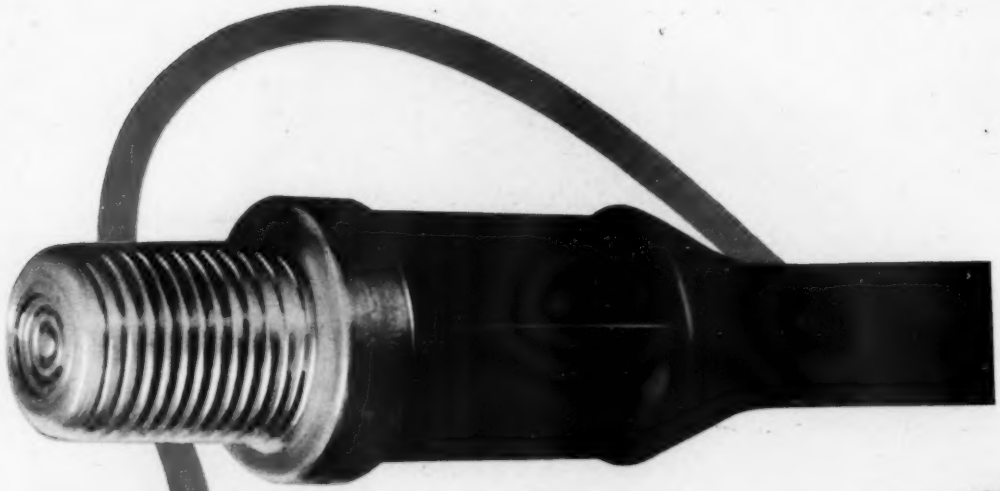

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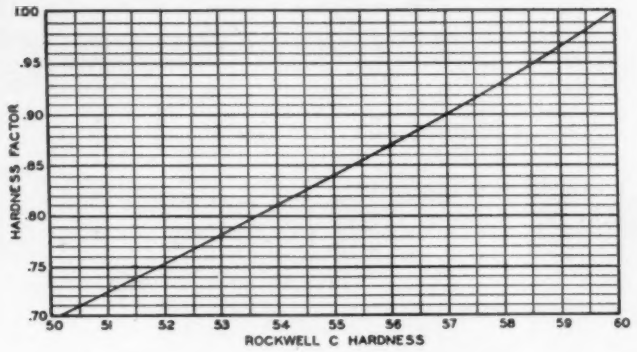
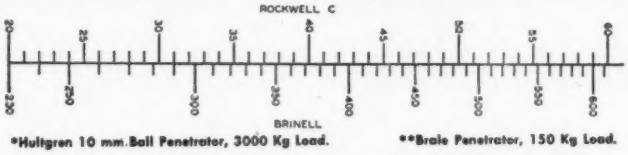
Relationship of Hardness Factor to Rockwell C Hardness



Brinnell* and Rockwell Hardness Equivalents for Hardened Steels**



*Hultgren 10 mm. Ball Penetrator, 3000 Kg Load. **Brale Penetrator, 150 Kg Load.

Rockwell-Brinnell conversion scale and hardness factor chart.

ings, the manufacturer provides a catalog showing available bearing types and sizes together with load, speed, and bearing-life data. All bearing-catalog tabular values of load capacity for their various bearings are established on certain basic hours of theoretical life, such as 1,500 hours, 3,000 hours, 5,000 hours, etc. Some are called "average" life which means that 50 per cent of the bearings will give tabular value hours of life.

Another rating called "minimum" life and sometimes called B-10 life is based on 10 per cent bearing replacements when the selected bearings are subjected to tabular loads and speeds. As can be noted the B-10 or minimum life basis is the more conservative of the two rating methods.

For selecting bearings for greater or less life than that of catalog tabular values, the manufacturers provide tables or charts giving multiplying factors for arriving at loads for use in selecting proper bearings. Such charts or tables show "hours life" vs. "life factors," which is another way of expressing the safety factor.

Example.—A bearing is to be selected from a catalog where tabular values give 5,000 hours average life for the various speeds. The bearing is to be selected for 20,000 hours. The load on the bearing at 500 r.p.m. is calculated to be 1,000 lb. What is the load rating of the bearing on the catalog basis?

Solution.—From the table the life factor for 20,000 hours is found to be 1.587. Then:

$$1.587 \times 1{,}000 = 1{,}587 \text{ lb.}$$

A bearing having a rating of at least 1,587 lb. is then selected from the "load rating tables."

If the same application required a life of 3,000 hours, what must the load rating of the bearing be on the catalog basis?

The life factor for 3,000 hours is 0.843. Then:

$$0.843 \times 1{,}000 = 843 \text{ lb.,}$$
the minimum bearing rating.

Some catalogs give tabular bearing load capacities at 500 r.p.m. Where capacities at different speeds are required, "speed factor" tables or graphs are employed. The use of these graphs or tables is illustrated as follows:

Example.—A bearing is rated at 3,000 lb. for 5,000 hours at 500 r.p.m. What would be its rating at 250 r.p.m.?

Solution.—From table, the speed factor for 250 r.p.m. is found to be 1.260.

$$1.260 \times 3{,}000 = 3{,}780 \text{ lb.}$$

Bearing-load capacity tables are usually for rotating inner races. Where a shaft is stationary some bearing manufacturers recommend increasing the load for the bearing in order to use the tables. This increment factor varies somewhat with different manufacturers, therefore the particular catalog should be consulted for the specific problem.

Where bearings are to be applied with either race omitted, the surface upon which the rollers operate must have a hardness as recommended by the manufacturer.

If the shaft hardness is below the recommended standard, load carrying capacity of the bearing must be reduced accordingly.

There are many details to be taken into account in selecting various types and makes of bearings. Consequently the designer should study very carefully the information contained in catalogs of the various bearing manufacturers or contact with their engineering departments for proper procedure in selecting and applying the particular make of bearings.

Power transmitted by multiple-speed units imposes different loads on the bearings at each speed. It is possible to base the selection of bearings on the most severe conditions under which it will operate, but this may result in choosing one of much greater capacity than is actually required.

Where bearing loads and period of duration for each speed are known, or can be estimated, a more desirable choice can be made on an equivalent fatigue basis. Here fatigue is equivalent to the product of the load cubed times the speed, and the time of operation, or:

$$F = L^3 \times n \times t$$

where

F = fatigue
L = load, in pounds
n = r.p.m.
t = time, in hours

Example.—A bearing is to operate under the following conditions:

Condition 1: Under L_1 lb., at n_1 r.p.m., for t_1 hours.
Condition 2: Under L_2 lb., at n_2 r.p.m., for t_2 hours.
Condition 3: Under L_3 lb., at n_3 r.p.m., for t_3 hours.
$t_1 + t_2 + t_3$ = expected life.

Solution.—The fatigue for each condition will be:

1. $F_1 = L_1^3 \times n_1 \times t_1$
2. $F_2 = L_2^3 \times n_2 \times t_2$

Total fatigue $= F_1 + F_2 + F_3 = F_T$

A suitable bearing must have a fatigue capacity at least equivalent to that induced by the operating conditions. That is, the fatigue capacity must equal or be greater than F_T.

To select the bearing, assume any convenient speed at catalog rated life, such as, 500 r.p.m. and 5,000 hours. The required bearing load rating, R, is then found by the equation:

$$R = (F_T/500 \times 5{,}000)^{1/3} \qquad (1)$$

A bearing having a rating at least equal to R is then chosen from the tables.

Example.—Consider a bearing which is required to operate under the following conditions:

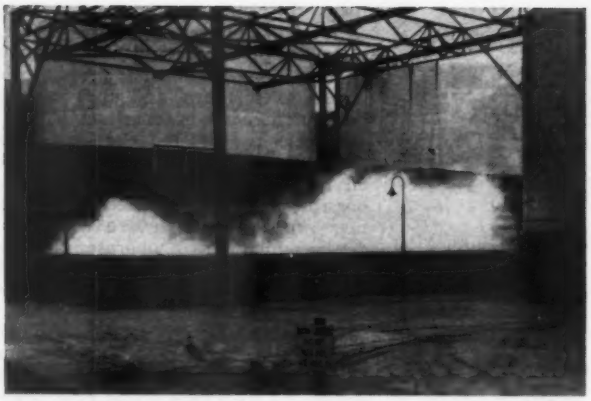
		Hours
1.	550 lb. at 270 r.p.m.	500
2.	770 lb. at 380 r.p.m.	500
3.	1,150 lb. at 580 r.p.m.	3,000
4.	730 lb. at 820 r.p.m.	4,500
5.	700 lb. at 1,500 r.p.m.	1,500
		10,000

Solution.—The fatigue in each case will be:

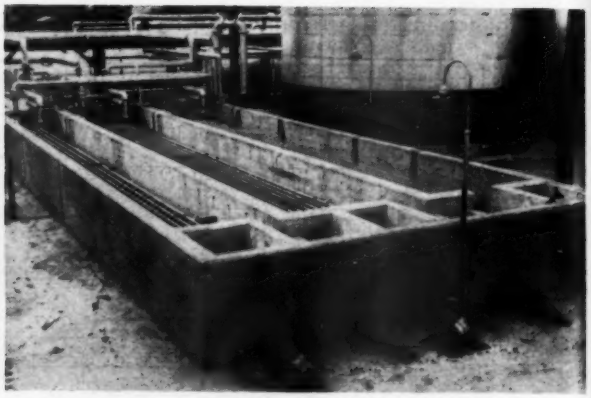
$F_1 = 0.550^3 \times 270 \times 500 = 22{,}410$
$F_2 = 0.770^3 \times 380 \times 500 = 86{,}880$
$F_3 = 1.150^3 \times 580 \times 3{,}000 = 2{,}646{,}540$
$F_4 = 0.730^3 \times 820 \times 4{,}500 = 1{,}435{,}410$
$F_5 = 0.700^3 \times 1{,}500 \times 1{,}500 = 771{,}750$

$F_T = 1{,}000^3 \times 4{,}962{,}990$

(Continued on page 108)



Concrete condenser box with steel superstructure for handling product cooling coils.



Concrete condenser box has three cells in which different product cooling coils are placed.

Concrete Condenser Box Skims Cooling Water

A CONCRETE condenser box that contains several features which appear to be quite desirable is being employed to cool the products of a solvent-refining unit. It is approximately 20 by 50 ft. poured in three separate compartments with dividing partition and outside walls about 10 in. thick at the top.

A cellar was excavated at the site to provide approximately two-thirds of the depth of the box to be below ground level so as to provide access by employes to inspect the condition of the cooling water and the coils, without climbing a ladder or mounting a tall stairway. A steel superstructure was erected above the entire condenser box to expedite maintenance. Thus the coil units may be lifted intact from the compartments and laid aside on the paved area for repair, or, an entirely new section can be installed without resorting to the use of rigging crane, or davits and gin poles.

By pouring the entire structure at one time, the walls and the floor consist of a monolith, reinforced with steel to prevent cracking and deterioration under temperature stresses. Dividing walls separate each section from an adjoining one so that cooling water may be supplied with the required flow to obtain the desired coil outlet temperature, without affecting the conditions in another section. The cooling sections are made of pipe having 180° return bends welded at the ends, and are mounted on structural-steel dividers and supports which fit neatly into concrete guides to keep them in the required position.

Cooling water is admitted to the condenser box at the process end where the products are valve-controlled, and flow in a single pass from the inlet to the outlet end of the structure. Each compartment contains two separate water-discharge boxes arranged so water from the floor of the compartment must pass upward between walls, as in an oil skimmer, so that only relatively clean water will pass at this outlet.

The water flows over a weir so the volume can be checked, and discharges into a clean water system which requires no further processing to remove contaminants. The surface flow of water enters the second compartment without obstruction, but the discharge from this part of the compartment is forced to enter a funnel-type outlet which is adjustable for height.

Long threaded connections are utilized with the funnel and connecting pipe to provide a wide range of adjustment. Therefore, if the water contains a considerable amount of floating contaminants, such as oil or other matter, the funnel can easily be screwed down so that a greater amount of water will flow into the dirty water system. If the water is clean and contains a minimum amount of floating material, the funnel can be screwed upward to retard the flow, or, by continuing, the water can be shut off entirely.

Left: Coils are secured to structural steel supports. Guides in slots of concrete box to hold pipe in desired position.

Right: Overflow funnel in dirty-water section is adjustable for high or low water level in concrete condenser box.

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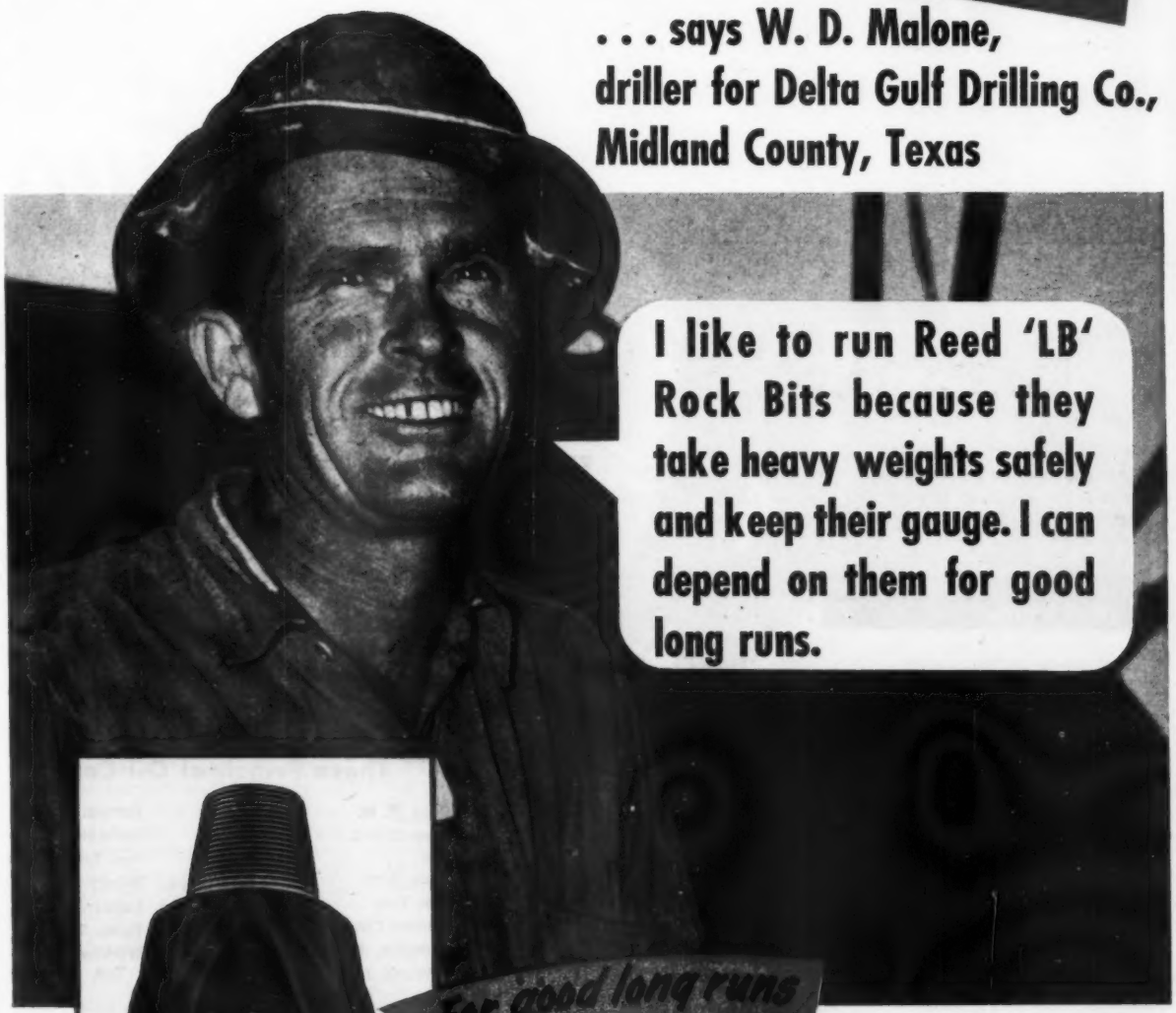
. . . says W. D. Malone, driller for Delta Gulf Drilling Co., Midland County, Texas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PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION MEMBER

QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Vanadium in Crude Oils—2—Ash Analysis

This is a continuation of the several questions stated in the issue of November 30, entitled "1—Occurrence." Later issues will discuss effects on refractories, tubes, hangers, etc.

The analyses of several ashes are shown in Table 1, and the limits of composition of the ashes of 14 Hungarian and 1 California petroleum are shown in Table 2.

The ash content of petroleum usually ranges from 0.01 to 0.05 per cent but amounts exceeding 0.11 per cent have been reported.

The vanadium content of petroleums, cokes, asphalts, etc., are reported in Table 3 and the vanadium contents of petroleum ashes in Table 4.

The vanadium content of western Venezuelan crude oils (Maracaibo region—State of Zulia) show a definite relation between the crude gravity and percentage of vanadium. Boscan of 10.6° A.P.I. contains 0.11 per cent whereas the lighter oils contain only about 0.03 per cent. The crude oils of eastern Venezuela (San Joaquin, Jusepin, Oficina and Quiriquire) contain much less vanadium.

Ash From Tankers Analyzed

Longobardi[3] states that the ash from fuel oil burned in tankers has been collected for commercial recovery of vanadium, recovering 45 g. of vanadium pentoxide per ton of ash from San Rafael petroleum. Ellis[3] reports the same, the recovery of ash from Mexican fuel oil burned in tankers being processed in British steelworks. was too low for commercial recovery. During World War II, vanadium-bearing ash from Venezuelan crude oils was collected from the stills of the Curacao and Aruba refineries in Shirey[1] concluded that the amount of ash in North American crude oils the Caribbean, but the practice has since been abandoned.

The American Society for Testing Materials in its Tentative Specifications for Fuel Oils (D 396-48T) specifies that the maximum ash content as 0.10 per cent on No. 4 and No. 5 oils with no requirements on Nos. 1, 2, and 6, nor does it directly attach any significance to ash in its "The Significance of Tests of Petroleum Products." It is obvious, of course, that large amounts of ash are troublesome because dust settles on boiler or pipe-still tubes causing lower heat-transfer rates. Soot or ash blowers are usually installed in boilers and pipe stills for the removal of such deposits. It has long been recognized that the lime or caustic soda used

TABLE 2
Approximate Range of Composition of Petroleum Ashes (Mainly from Hungaria)[2]
(Per cent)

SiO_2	5.43-60.49
Fe_2O_3	7.71-43.87
Al_2O_3	7.51-38.82
MnO	0.16- 0.47
NiO	0.03- 4.35
CaO	1.09-11.05
MgO	0.78- 4.26
K_2O	0 - 1.83
Na_2O	0.80-12.36
Li_2O	0 - 0.14
P_2O_5	0 - 0.02
V_2O_5	0 - 5.07
SO_3	1.45-21.04
Cl	0 - 0.20

TABLE 3—VANADIUM CONTENT OF PETROLEUM MATERIALS (PER CENT)

Material—	A.P.I.	Weight % V_2O_5 On material	Weight % V_2O_5 On ash	Reference
Crude oils:				
San Rafael, Argentina	...	0.0045	11.93	3
Sierra Lotena, Argentina	...	0.00032	....	4
Comodoro Rivadavia, Argentina	...	0.00025	....	4
San Joaquin, Venezuela	41.5	0.002	(*)	5
Jusepin, Venezuela	32.0	0.003	(*)	5
Oficina, Venezuela	26.7	0.023	(*)	5
Lagunillas Medium, Venezuela	26.3	0.027	(*)	5
La Rosa and Tia Juana, Medium, Venezuela	25.6	0.033	(*)	5
Colombia	24.2	0.018	(*)	5
Quiriquire, Venezuela	19.0	0.007	(*)	5
Lagunillas Heavy, Venezuela	17.6	0.042	(*)	5
La Rosa and Tia Juana, Heavy, Venezuela	16.5	0.048	(*)	5
Boscan, Venezuela	10.6	0.11	....	6
Asphalts:				
Terlinqua, Texas	...	0.22	....	7
Bermudez Lake, Venezuela	...	0.043	61.0	7
Guanoco, Monagas, Venezuela	...	0.016	30.0	7

*The vanadium pentoxide represented variously 8 to 28 per cent of the ash.

TABLE 4—VANADIUM CONTENT OF PETROLEUM ASHES (PER CENT)

Material—	Wt. % V_2O_5	Reference
Crude oils:		
San Rafael,* Argentina	11.93	3
Hungarian (and 1 California)	5.07	2
Persian	5.03	4
Andian, South America	43.0	4
Reduced crude oils:		
Arkansas City, Kans. (Roxana Petroleum)	5.9	7
Wichita, Kans. (Vickers Oil)	1.2	7
Coffeyville, Kans. (Sinclair)	0.65	7
Asphalts:		
Grahamite near Page, Okla.	12.2	7
Nevada	45.0	7
Murray County, Oklahoma	11.4	7
Bermudez Lake, Venezuela	61.0	7
Guanoco, Monogas, Venezuela	30.0	7
Cokes:		
California	5.07	1
Texas Panhandle	1.43	1
Kansas	0.438	1
Oklahoma	22.15	1
Dubbs cracking process (Roxana Petroleum)	1.9	7
Kansas (Standard Oil)	8.1	7

*Contains 0.0377 per cent ash.

TABLE 1—ANALYSES OF SEVEN UNITED STATES ASH SAMPLES[1] (PER CENT)

	1	2	3	4	5	6	7
SiO_2	38.79	40.31	31.68	1.55	0.75	9.99	....
Combined oxides	22.38	51.48	31.80	10.32	97.52	19.55	....
Fe_2O_3	**7.71**	**44.59**	**15.81**	**7.74**	**97.37**	**14.69**	....
MgO	1.81	1.19	4.18	2.49	0.239	1.27	....
CaO	8.68	3.45	12.62	5.26	0.68	4.79	....
Na_2O	9.51	2.58	6.90	30.80	0.129	23.60	....
K_2O	....	....	....	1.03	....	0.922	....
P_2O_5	....	**0.06**	....	....	....	....	....
MnO	0.302	0.198	0.437	0.33	0.213	0.038	....
V_2O_5	**5.07**	trace	trace	**1.43**	....	**0.438**	**22.14**
SO_3 (total)	15.02	1.44	10.80	42.11	0.875	36.41	....
SO_3 (water soluble)	....	....	....	**42.06**	....	**34.36**	....
NiO	4.35	0.33	0.533	1.52	none	0.571	5.89
Li_2O	0.144	0.163	....	....	....	....	....
Chloride (water soluble)	....	....	....	4.64	....	0.10	....
Total	100.99	101.14	98.96	100.07	100.40	97.24	....

Boldface numbers not counted in the total because they were included elsewhere.
1. California—Coke from a fire in a cement reservoir. Possibly contaminated by cement.
2. Wyoming—Ash from grate burning coke. Probably high in iron from grates.
3. Mixed Mid-Continent—Ash from grade burning coke.
4. Texas Panhandle—Petroleum coke.
5. Pennsylvania—Coke from a distilled fuel-oil cut.
6. Kansas—Cracking-still coke.
7. Oklahoma—Cracking-still coke.

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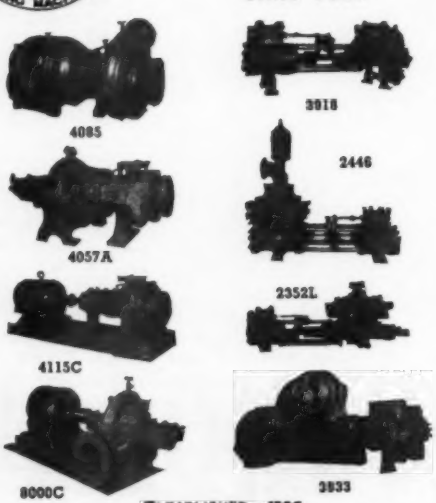

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in cracking plants for neutralization of sulfur corrosion, appears in the ash and in many instances fluxes with the refractory walls. In a few instances the author has seen a pool of molten eutectic on the floor of hot pipe stills. In burning acid sludge which has been neutralized or digested with lime, trouble is frequently encountered. Seiler[8] reports that troublesome deposits are formed on the nozzles of sprayers (possibly meaning burners) when burning certain high ash oils. He felt that 0.05 per cent was far too high an ash content.

Spectroscopic Detection

Vanadium can be detected by spectroscopic methods but the qualitative method is of little value because at least traces of vanadium are present in nearly every oil. Carlson and Gunn of Humble Oil & Refining Co. have recently described the use of the "Emission Spectrograph." Ash can, of course, be determined by method D 482-46 of the A.S.T.M. Perhaps the best method of determining vanadium is to conduct a quantitative analysis on some of the ash from a commercial still, but contamination could occur.

Practical means of removing or reducing the ash content, other than the customary desalting operations, have not been developed. Desalting or dehydration removes materials held in suspension by emulsions with water but they probably do not materially affect the real mineral constituents of petroleum which are thought to be metallic chemical compounds such as naphthenates. However, E. T. Scafe of Socony-Vacuum Oil Co., Inc., is said[10] to have developed an economical method of "deashing" residuums. The method involves treatment at an elevated temperature with molten boric acid which results in the formation of insoluble sodium borate by reaction with sodium naphthenates. Vanadium is not mentioned in connection with the boric acid method.

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Natural-Gas Processing

(Continued from page 87)

operates totally condensing at about 300 psi.

There is considerable difference of opinion among process technologists concerning attainable propane recovery as it is influenced by degree of removal of methane and ethane in a rich-oil stabilizer. It is the author's opinion that where primary absorption takes place at 500 psi. or greater on gas from which a minimum of 3 gal. per M.c.f. of recoverable liquid products is expected, some 80 to 90 per cent of the propane can be recovered by employing rich-oil deethanization and a single still operating at a pressure between 100 and 125 psi.

By way of explanation of the recommended minimum pressure condition for primary absorption and liquefiable content of the gas, it is well to remember that the bubble point of the stabilized rich oil which, of course, establishes the rich-oil stabilizer bottom temperature, varies quite widely with the quantity of absorbed constituents. In other words, if it is necessary to circulate a large quantity of lean oil to obtain desired recoveries, the bubble point of the rich oil will be relatively high, requiring

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lower column operating pressure and hence a greater amount of lean oil to the reabsorption section. Conversely, by processing a rich gas at high pressure, the ratio of lean oil circulated to quantity of absorbed constituents become lower and the temperature required for reboiling is reduced, thus permitting increased column operating pressure and a lower oil rate to the reabsorption section for a given recovery of propane.

Since rich-oil deethanization eliminates one still, a final deethanizing fractionating column and a recompressor along with expensive auxiliaries, it is estimated that the investment for a plant handling as much as 60,000,000 cu. ft. of gas daily would be reduced about $400,000 by deethanizing the rich oil. Further, operating costs for the simpler unit would be considerably reduced.

Methods of supplying heat to rich-oil stabilizers have stimulated considerable interest and discussion among process engineers recently. Those who advocate total heat input at the base of the column contend that heat supplied intertray lowers tray efficiency in the section of the column involved. However, the practice of supplying some 60 per cent of the heat at the bottom, 30 per cent intertray, and the remainder in the feed by judicious arrangements of the oil-to-oil heat exchangers has the distinct advantage of attaining higher over-all thermal efficiencies. This results from the fact that the lean oil returns to the final cooler at a temperature 40° to 50° F. cooler than is possible when supplying all the heat at the bottom. In other words, full advantage is taken of favorable mean-temperature differences and no heat other than that available from the lean oil is required.

One of the most recent and interesting developments is the combination primary absorber and rich-oil deethanizer.

While Fig. 6 does not represent any specific plant now in operation, it is typical of plants under construction and to be built in the near future. In this illustration, primary absorption and deethanization take place simultaneously in a single column operating at 500 psi. with a bottom temperature of 275° F. The deethanized rich oil is heated to 400° F. by exchange with lean oil from the base of a single still operating at 100 psi.

The lean oil is heated to 500° F. in a direct-fired heater prior to furnishing heat to the rich oil feed. Overhead vapor from the still is totally condensed thus eliminating any further processing. Rich-oil deethanization is accomplished to the extent that no final deethanizing fractionating column is required, hence the overhead from the depropanizer is commercial propane. Propane recoveries as high as 75 per cent may be realized depending, of course, to a large extent, upon content of the rich gas.

It should be made clear that this process is practicable only when the gas to be processed is very rich in the propane and heavier constituents and correspondingly deficient in methane and ethane. By processing a very rich gas at 500 psi., the large quantity of absorbed hydrocarbons permits the bubble point of the stabilized rich oil to be within reasonable limits, in this case 275° F. Thus the problem of accomplishing primary absorption, partial stripping, and reabsorption all in a single column, simply becomes a matter of supplying sufficient heat to the bottom and enough lean oil to the top of the column.

In many of the more recent plants, full advantage has been taken of the higher temperature levels required for propane recovery to use aerial condensers where practicable. In addition to using this equipment for engine-jacket water cooling, many plants now employ them for primary and secondary still reflux condensing, excess exhaust-steam condensing, initial high-level gas and refrigerant cooling, and indeed in any service where mean-temperature differences are sufficiently high to permit their economic application.

Although direct-fired oil heaters have largely replaced steam boilers for supplying the major portion of process heat, steam remains the old reliable for accomplishing final stripping in the stills. In this connection, waste-heat boilers are now being used in some plants to furnish the relatively small amount of low-pressure stripping steam required. These units usually consist of a small steam drum mounted above heat-exchanger sections, the heat being supplied to the water by hot oil.

With such a system, pumps which ordinarily would have been driven with high-pressure steam are sometimes powered by heating high-pressure residue gas from hot oil, the exhaust gas from the pumps being used for fuel. Of course, the temperature level of the hot oil used for this purpose is such that the heat would otherwise have been wasted. In many cases, high over-all thermal efficiencies are maintained by the conventional use of exhaust steam from pumps and power auxiliaries which lend themselves well to steam drive.

A few plants have been built in the past 5 years which make use of superheated ethane as partial pressure stripping medium in lieu of steam. The one difficulty lies in the fact that not only is the ethane uncondensable at the temperatures and pressures involved, but, of course, it reduces the percentage condensation of the net overhead material. This simply means that the recycle load to be handled by recompression or reabsorption becomes greater and in many cases prohibitive.

It is noteworthy that although cycling plants usually operate at considerably higher pressures than most gasoline plants, the processes employed are essentially the same. This is, of course, reasonable since, with the exception of some of the higher-boiling-point constituents which compose the so-called distillate, the products recovered are identical.

Antifriction Bearings

(Continued from page 101)

Solution.—The load is considered in thousands of pounds for convenience. The total fatigue, F_T, is the sum of the fatigue values for each condition of operation.

With 500 r.p.m. and 5,000 hours rated expected life and the value for F_T substituted in Equation 1:

$$R = 4{,}962{,}990 \times 1{,}000^3/500 \times 5{,}000)^{1/3} = 1{,}257 \text{ lb.}$$

The bearing required to operate under the conditions described for 10,000 hours, must be rated for at least 1,257 lb. at 500 r.p.m. for 5,000 hours. The bearing type having previously been determined, the correct capacity size can then be selected from the load rating tables.

Installation

In installation many bearings are applied to rotating shafts so that the inner race rotates and the outer race fits in a stationary housing. There are cases where this condition is reversed. Also there are applications where both races rotate and there may be rotation of the two races relative to one another.

The general rule for applying races specifies that the rotating race is to be applied with a press or tight fit, while the other race is applied with a "tap" or "push" fit.

In some machinery, due to peculiarity of assembly or loading during operation, both races may be installed somewhere between a press and a tap fit. But the races must be constrained endwise to keep them from rotating. The races may be keyed by notching the end of the races, or blind dowels may be used. There are many methods for fitting of races of various makes and it is necessary to follow manufacturers specific instructions for any given case.

Sometimes special conditions of operation must be met with special fits, special internal running clearances, and even specially shaped bearings. Such conditions require close coordination between the customer and the bearing manufacturer.

A shaft must be supported radially as well as axially. Many applications are such that two opposed dual-purpose bearings can be used to support a shaft. In this case one bearing takes thrust loads while the opposing bearing is subjected only to radial loads. A different problem is presented when trying to maintain endwise

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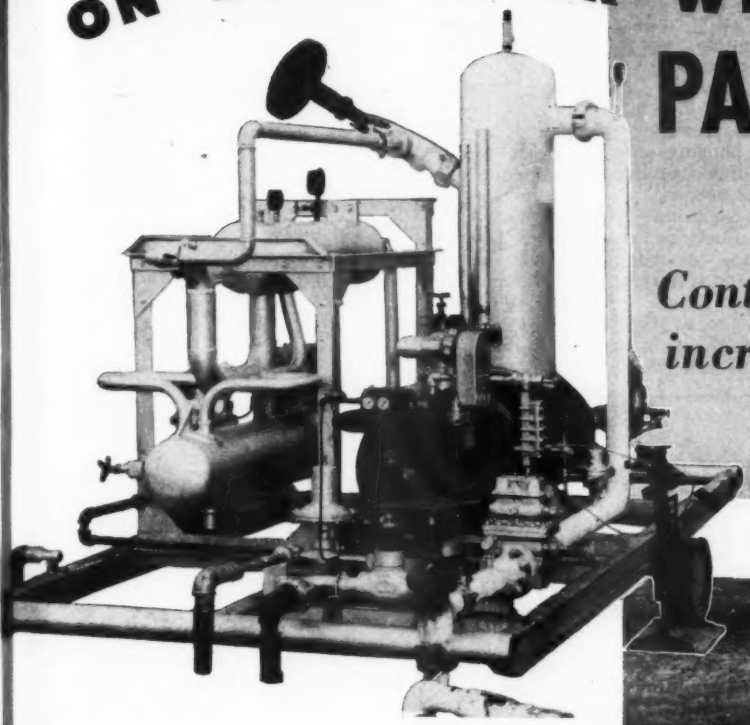
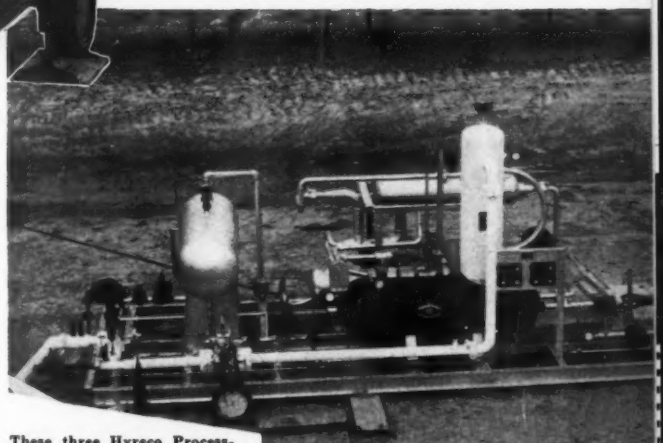
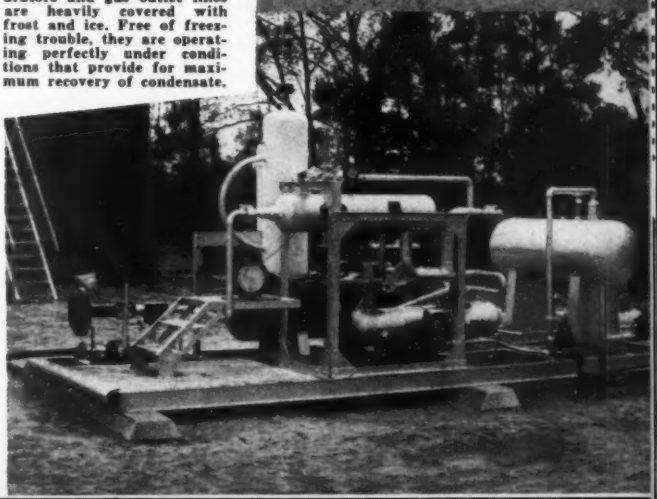




These three Hyreco Processing Units are operating at temperatures so low the separators and gas outlet lines are heavily covered with frost and ice. Free of freezing trouble, they are operating perfectly under conditions that provide for maximum recovery of condensate.



The records of field testing are being reproved with every installation. Substantial increases in condensate recovery are bringing new profits to the owners of Hyreco Processing Units . . . are eliminating the expense of down time due to line freezing . . . are obviating the use of heaters and their costly operation.

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shaft location in either direction by each of two opposing bearings. This latter condition is difficult to accomplish when the shaft is subjected to temperature variations over that of the surrounding material in the machine. This condition calls for special consideration and in many cases some experimenting is necessary to arrive at the final answer. This is especially true where the shaft is of considerable length.

Installation of one-piece bearings on rotating shafting is made with a press fit between inner race and shaft, while the outer race is usually tap or push fit in the housing bore. The press fit at the inner race is usually tight enough to retain it without resorting to other means. However, in some cases shaft shoulders, snap rings, tongued washers and double locknuts are used. The outer race does not need to be retained endwise unless this bearing is the shaft locating bearing, in which case this race is retained by an integral housing shoulder, snap rings, or shoulder retaining caps which fit into the housing.

With separable-type bearings, both races must be retained externally with the devices previously mentioned, or if either of the races has a single flange, in the case of a straight roller bearing, the problem of retainment is reduced. However, flanged race bearings, when used only to reduce external retainment problems, increase costs. Provisions for external retainment are usually more desirable.

In addition to retaining the races endwise and fitting the inner race to a shaft, the outer race must be supported in a suitable housing rigidly enough to hold the outer race in proper alignment for all anticipated loadings.

When races are press fitted it is necessary to provide a good clean surface free of taper and out-of-roundness, because the condition and shape of the shaft or housing surface affect the operating surface of the races. Such surfaces should be ground if possible. All shaft or housing bore surfaces should at least have a good machined finish.

Incorporated into the design of the bearing mounting is the provision for admitting a lubricant. The housing design also should be such that free operation of the bearing rolling elements is assured, that it, no part of the housing should touch the cage or rollers.

In applying a race with a press fit it can be pressed on the shaft or in a housing with proper tools, and in case of an inner race it can be expanded sufficiently if heated in oil to not over 300° F.

Care of Bearings

Antifriction bearings must at all times be kept in clean surroundings free of anything that is gritty or corrosive to alloy steel. As delivered from the manufacturers, bearings are coated with a mineral-oil protective compound and wrapped. The coating should not be removed even when the bearings are put into service, because the compound is compatible with any type lubricant subsequently used for the bearing.

Handle bearings as little as possible. Excessive handling invites trouble from corrosion from perspiration. Bearings should be stored in original wrappings, preferably in a cool, dry, clean place. Once unwrapped a bearing should be installed as soon as possible. Where they are to remain unwrapped for a short period the bearings should be stored in closed pans or boxes containing enough oil to cover them.

Proper lubrication of bearings at all times comes under the category of care. This is a specialized problem which should be referred to a lubrication engineer. Many factors enter into the problem of bearing lubrication but one thing of importance is that too much lubricant in antifriction bearings can result in as much trouble as when too little lubricant is used. A bearing if turning fast enough will generate sufficient heat to break down the grease as well as ruin the bearing, if it is solidly packed with grease.

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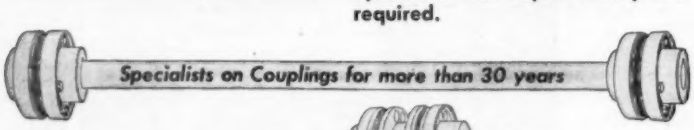

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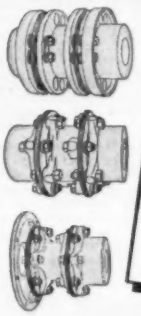

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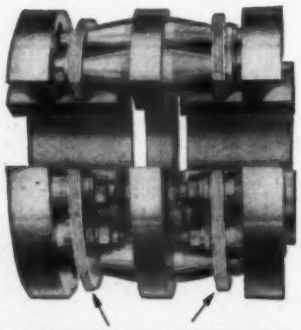

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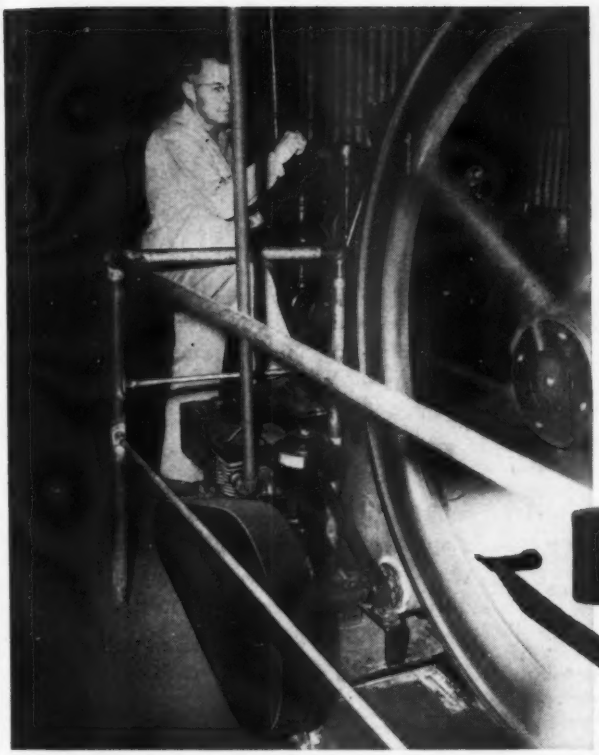

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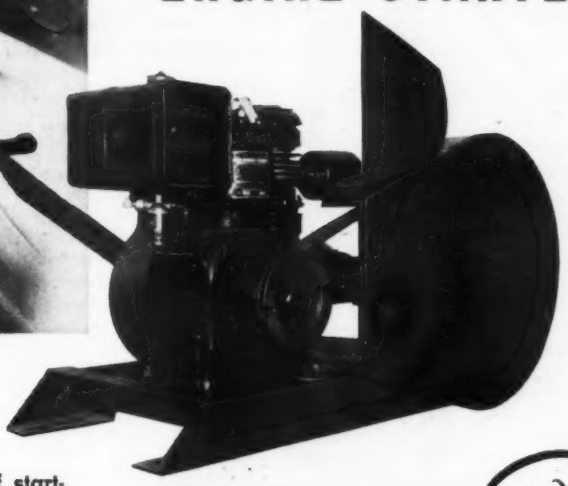

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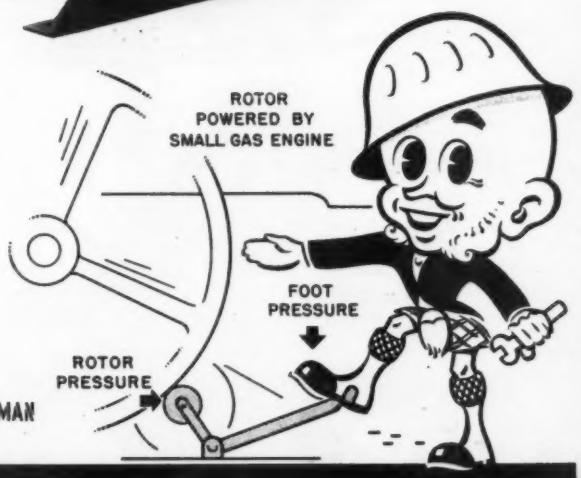

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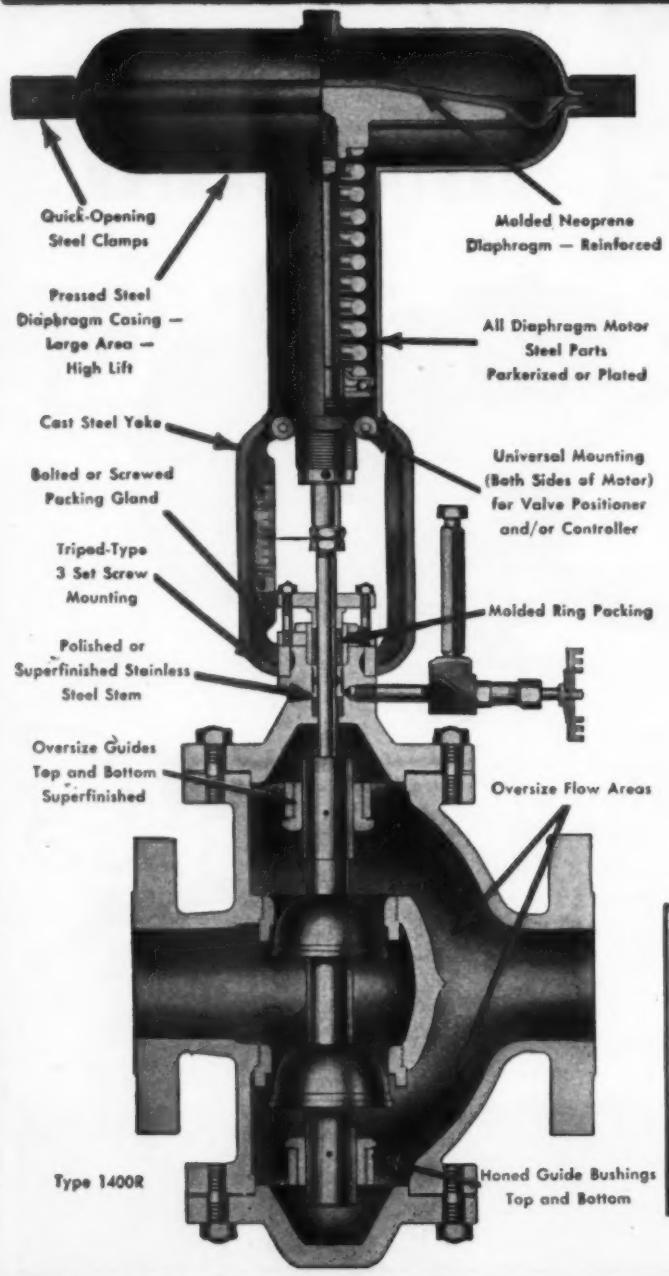
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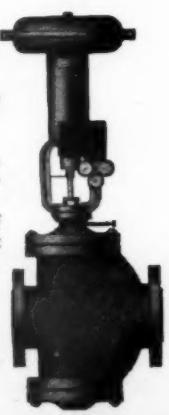

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Estimation of Water Influx

IT has been observed that water influx into a reservoir should be dependent upon the reservoir pressure at any stage of depletion and the time over which the water influx has been active, these two variables being combined into some complex function. One might also reason that the water encroachment on a reservoir should be some function of the space voided within the reservoir to permit water entry. Or, inasmuch as the amount of oil production reflects the degree of depletion and the time of production and also the amount of space voided within the reservoir, it might be reasoned that the water influx should be some function of the withdrawals.

As a matter of fact, the water influx must be dependent to a certain degree upon withdrawals because there can be no water-phase pressure gradient without the removal of fluid from the reservoir. It is necessary to consider whether or not the ability of the water to enter the reservoir is less or greater than the ability to withdraw fluids from the producing wells.

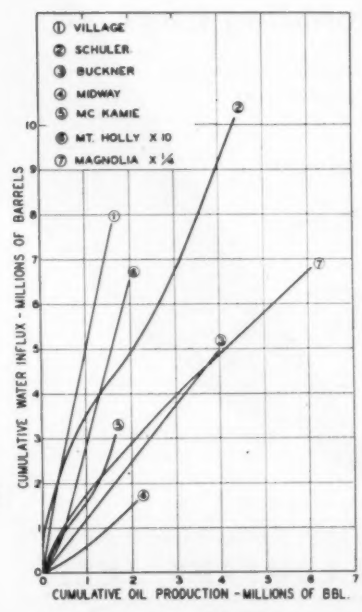

Fig. 1

If the former, the reservoir is apt to be only partially water-drive controlled, the faster withdrawal through the wells exceeding the speed of the drive with the consequence that partial production of oil must be by solution gas.

It is seen empirically in the published results of studies of the Smackover lime fields that there is an approximately constant correlation between the cumulative water influx and the cumulative oil production. Fig. 1 is a cross plot of curves from Reference 1 showing the withdrawal - influx ratio for seven fields reported analyzed. None are a constant ratio between production and influx, but as a first approximation for evaluation purposes, each might be said to be linear, at least after an initial period. The water encroachment, W, could thus be written as

$$W = f\,\Delta N + B \qquad (1)$$

where f is the slope of the linear portion and B is a constant. In one case there appears to be no need for this last constant and the relationship is $W = f\Delta N$. All could be approximated by a relationship of this type to a lesser degree of accuracy than is Equation 1.

If this were always valid as an approximate expression for water influx, the estimation of the encroachment would be empirically possible by a correlation to show some basis for the choice of a ratio value, f. This might be possible through the material balance equation into which the ratio is substituted for water drive.

Let the material-balance equation be written for two time intervals in the production history of the reservoir (for simplicity the gas-cap term is omitted). The two equations are then subtracted to give a balance over the time interval considered, thus:

$$N(u_1 - u_o) = \Delta N_1 [u_1 + (R_c - r_o)\, v_1] - W_1 + w_1$$

$$N(u_2 - u_o) = \Delta N_2 [u_2 + (R_c - r_o)\, v_2] - W_2 + w_2$$

then:

$$N(u_2 - u_1) = \Delta N_2 [u_2 + (R_c - r_o)\, v_2] - \Delta N_1 [u_1 + (R_c - r_o)\, v_1] - W_2 + W_1 + w_2 - w_1 \qquad (2)$$

In place of W_1 and W_2, substitute their equivalent from Equation 1. This gives:

$$N(u_2 - u_1) = \Delta N_2 [u_2 + (R_c - r_o)\, v_2] - \Delta N_1 [u_1 + (R_c - r_o)\, v_1] - f(\Delta N_2 - \Delta N_1) + w_2 - w_1 \qquad (3)$$

The equation can also be written for two other times, giving a material balance over another time interval. Inasmuch as the two time intervals are independent of one another the two equations can be solved simultaneously to yield values of f and N. The equation for the second time interval, bounded by times 3 and 4, would be the same as Equation 3 with the subscript 4 substituted for 2 and the subscript 3 substituted for 1. This same process of solving simultaneous equations similar to that above can be repeated over any portion of the reservoir's history when four independent sets of production data are available.

The use of this method presupposes some knowledge that water drive exists and that one of its characteristics will be an approximate linear influx with cumulative oil production. Note that the evaluation gives only f, which would be a constant only after the initial encroachment period was over. The method should give changing values of f even though influx were not linear.

The material-balance prediction for partial water drive can also be simplified if the approximation $W = f\,\Delta N$ is valid. In this event, the prediction can be carried on for a solution-gas drive research with $f\,\Delta N$ being used to evaluate the shrinkage in size of the solution gas drive reservoir just as was done for the expanding gas cap (Engineering Fundamentals No. 422).

Reference

1. Bruce, A Study of the Smackover Limestone Formation, A.I.M.E. Trans., 1944, Vol. 155.

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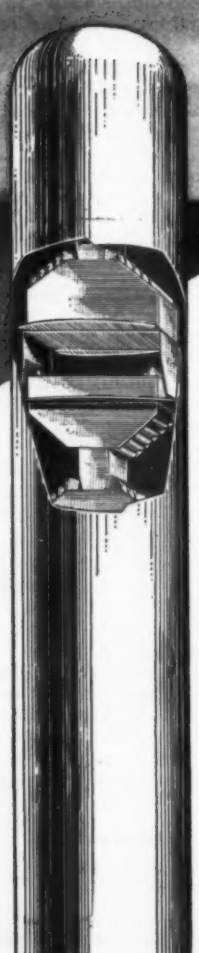

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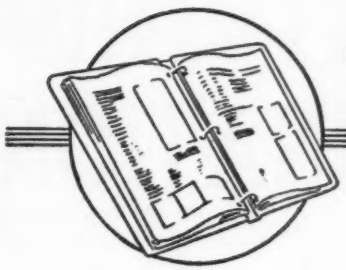

THE REFINER'S notebook

Conventional Adjustments*

THE response of proportional, proportional-derivative, proportional-reset, and conventional three-function controllers has been reviewed, with particular reference to startup characteristics. Action of the conventional proportional-reset-derivative controller and the "Tri-Act" controller have been discussed with the aid of schematic controller construction diagrams. For better understanding of the adjustments on the new Tri-Act controller as related to adjustments of the conventional three-function instrument, the following equations are presented:

Proportional controller

$$p - p_o = S\,(x - x_o) \quad \text{or} \quad \frac{dp}{dt} = S\,\frac{dx}{dt} \qquad (1)$$

Proportional plus derivative

$$p - p_o = S\,(x - x_o) + ST\,\frac{dx}{dt}$$

$$\text{or} \quad \frac{dp}{dt} = S\,\frac{dx}{dt} + ST\,\frac{d^2x}{dt^2} \qquad (2)$$

Proportional plus reset

$$\frac{dp}{dt} = SR\,(x - x_o) + S\,\frac{dx}{dt} \qquad (3)$$

where:

- $p - p_o$ = change in output pressure of the controller
- $(x - x_o)$ = change in the input to the controller, or change in the controlled variable
- dp/dt = rate of change in output pressure of the controller
- dx/dt = rate of change in the input to the controller, or rate of change in the controlled variable
- S, T, R = constants determining the magnitude of the control effects, or controller adjustments. S is sensitivity or throttling range, R the reset rate, and T the derivative or rate time adjustment

Conventional controller with three responses.—Performance of the conventional proportional-reset-derivative controller was shown in Figs. 1A and 1B of Installment 47 and its construction was illustrated schematically in Fig. 2 of that installment. The equation used to describe mathematically the performance of such a controller is:

$$\frac{dp}{dt} = SR\,(x - x_o) + S\,\frac{dx}{dt} + ST\,\frac{d^2x}{dt^2}$$

$$= S\left[R\,(x - x_o) + \frac{dx}{dt} + T\,\frac{d^2x}{dt^2}\right] \qquad (4)$$

It will be noted that this equation is obtained by adding the responses. Unfortunately, the mechanisms which have been used in conventional control systems do not produce results which correspond to this equation.

Consider the adjustments, S, R, and T of this controller. First, set "R" equal to infinity (open the restriction) and "T" equal to zero (open the restriction). While the output pressure enters both sides of the bellows unit, the nozzle does not move and the controller has a high sensitivity. Now, when "R" and "T" are closed equal amounts (the product of RT equals 1), again the nozzle does not move and the controller remains in a high sensitivity. While we know this to be the fact from this analysis of the circuit as well as from actual observation, this is not indicated by Equation 4. Therefore, Equation 4 must not apply to this particular controller. While it is not our intention to go through the mathematical details, the equation which describes the action of the controller of Fig. 2, Installment 47, with a reasonable accuracy is:

$$\frac{dp}{dt} = \frac{(1+RT)}{(1-RT)}\,S\left[\frac{R}{1+RT}\,(x - x_o) + \frac{dx}{dt} + \frac{T}{1+RT}\,\frac{d^2x}{dt^2}\right] \qquad (5)$$

Now let us examine this equation to determine how well it fits the observed results. First, when we set $T = 0$, the equation becomes identical with Equation 4. In other words, the instrument behaves in an orthodox manner with the proportional and automatic reset responses. When the reset restriction "R" is closed ($R = 0$) Equation 5 becomes Equation 2, and again the instrument behaves in an expected fashion. Now let us set the product of $RT = 1$ and $(1 + RT)/(1 - RT)$ becames infinite indicating that the sensitivity of the controller is extremely high. This corresponds with the observed results. Therefore, while we have not proven that Equation 5 is a good mathematical description of the controller shown in Fig. 2 of Installment 47, it appears to correspond with the observed results and this can be verified mathematically.

*Portion of paper, "Tri-Act Control—A New Concept," by R. E. Clarridge, Taylor Instrument Cos., presented at fifth annual instrument symposium, Texas A. & M. College.

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1 MULTISTAGE CENTRIFUGAL PUMPS. Form 7233 describes class HMTA centrifugal pumps for pressures up to 1,200 psi. and capacities to 1,600 g.p.m. These pumps are built in 3, 4, 5, and 6-in. sizes with from 3 to 9 stages. *Ingersoll-Rand Co.*

2 SEISMOGRAPH AND THE SEARCH FOR OIL is intended to present a simple, nontechnical explanation of the means whereby accumulations of petroleum may be discovered through use of the seismograph. *National Geophysical Co., Inc.*

3 PIPE-LINE PROTECTION, a 2-color, 36-page booklet, covers successful measures evolved to combat corrosion of pipe lines. In addition to application methods for Bitumastic, the booklet devotes space to causes of corrosion and lists 14 essential requirements of an efficient pipe coating. *Wailes Dove Bitumastic, Ltd.*

4 OIL WELL AND FORMATION CONDITIONER describes a modern method of solving paraffin problems. Diagrams and half tones illustrate the action of Swan-O-Tret in the dissolution of paraffin in lead lines, tank bottoms, tubing and rods, well bore, and formation. *Swan Oil Well Treating Co., Inc.*

5 FOUNDATION FOR FAILURE. Five outstanding advantages of the Otis tubing caliper and an explanation of the equipment's use in corrosion surveys are featured in a multicolor, four-page folder. *Otis Pressure Control, Inc.*

6 TEXAS STRIPPER ROD PUMPS. This illustrated, multicolor brochure describes a stationary-barrel, bottom-hold-down-type rod pump which is available in a wide range of barrel-tube and plunger-length combinations. *Harbison-Fischer Manufacturing Co.*

7 ELLIOTTRONIC POTENTIOMETER RECORDER is a 14-page, illustrated book featuring the advantages of an exceedingly accurate industrial recording instrument with full provision made for use with automatic control system. *Elliott Brothers, Ltd.*

8 BLOWOFF VALVES FOR HIGH-PRESSURE BOILERS. Bulletin B-433 gives revised details on a line of blowoff valves. Dimension tables and selector charts add to the usefulness of the book. *Yarnall-Waring Co.*

9 FARVAL SPRAY VALVE illustrates the application of a valve for accurately controlled spraying of lubricants onto open gearing, slide surfaces, and other open bearing areas. *The Farval Corp.*

10 VALVES ON L.P.G. EQUIPMENT emphasizes the advantages of positive control, bronze, globe, angle, and check valves for liquefied petroleum gas service. *Ohio Injector Co.*

11 GEARTURBO PUMP HEAD. Descriptions of right-angle geared pump drives and their application to

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OIL AND GAS EQUIPMENT Digest NEWS CHECK IT

vertical turbine pumps are featured in this comprehensive new bulletin. Gearturbo heads are offered in nine sizes, with speed-increasing ratios of 1 to 1, 1 to 2, 2 to 3, 3 to 4, and 4 to 7, and with one speed-decreasing ratio of 11 to 10, and in horsepower ratings from 3 to 300 hp. *Peerless Pump Division, Food Machinery & Chemical Corp.*

12 BUILD AND INSULATE WITH ONE MATERIAL deals with Marinite, a sheet material composed of asbestos fibers, diatomaceous silica, and an inorganic binder. This four-page illustrated folder specifically directs attention to the use of Marinite for breechings; for the construction of ovens and driers; and for the fireproofing of structural steel. *Johns-Manville.*

13 DIESEL ENGINES. A new four-page bulletin, No. 321, covers Series 600 diesel engines. These engines have a 12¾-in. bore, 15½-in. stroke, and a speed range from 360 to 625 r.p.m. They include both naturally aspirated and supercharged engines for stationary and marine service. *The Baldwin Locomotive Works.*

14 METALLIZING PROCESS PROTECTS METALS AGAINST HEAT OXIDATION. A new four-page bulletin describes and illustrates several applications of a process for protecting metals against heat oxidation. Life of these parts has been increased from 200 to 800 per cent. *Metallizing Engineering Co., Inc.*

15 TEN QUESTIONS TO ASK A DIESEL-ENGINE SALESMAN asks and answers 10 questions pertaining to diesel-engine design and gives full mechanical details on the Murphy Diesel line of engines. *Murphy Diesel Co.*

16 MOTOR-GENERATOR BOOKLET. A new eight-page, two-color booklet on synchronous motor-generator sets covers sets from 30 to 8,000 kw. as a source of d.c. power for industrial applications. *General Electric Co.*

17 LODOVER, a new 1-yd. combination overhead and front-end shovel for International Harvester tractors, is fully described in a new eight-page illustrated catalog. *Service Supply Corp.*

18 DRY-TYPE TRANSFORMER FEATURES. A new 23-page booklet, B-4428, gives reasons why dry-type transformers are safer and less expensive to install and maintain in industrial plants, mines, utilities, and the like are shown. *Westinghouse Electric Corp.*

19 BULLETIN NO. 102 covers Squires Class "H" pressure regulator and pump governor. This valve is extremely simple in design and is admirably suited to installations where the close regulation of a pilot-operated valve is not necessary. *C. E. Squires Co.*

20 EVOLUTION OF A LEADER contains the history of "bulldozing" from the equipment manufacturer's viewpoint. *The Baker Manufacturing Co.*

21 ALUMINUM ROLLING SCAFFOLDS. The bulletin is well illustrated, including pictures and photographs of scaffolds in actual use, with specifications, making it a valuable piece for any scaffolding file. *Patent Scaffolding Co., Inc.*

22 OMEGA UNIVERSAL FEEDERS. This 12-page bulletin is devoted to three sizes covering a chemical feeding range from 1 to 5,000 lb. per hour. These Universal feeders are designed to handle practically all types of dry chemicals or materials used in the treatment of water and in many process industries. *Omega Machine Co.*

23 NEW REGULATOR FOLDER. A new four-page folder gives useful information on temperature regulators, pressure regulators, and desuperheaters. A complete explanation of the principles of pilot-operated regulating valves is given in addition to data and illustrations of 27 Spence pilots. *Spence Engineering Co.*

24 SODA ASH. A comprehensive 64-page illustrated manual, gives a completely detailed history of one of the most important basic chemicals. Chapters are devoted to soda ash production and uses, methods of manufacture, forms and grades, unloading and handling, in fact all pertinent data on this essential raw material. *Pittsburgh Plate Glass Co., Columbia Chemical Division.*

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OIL AND GAS EQUIPMENT Digest

IT'S NEW ✓ CHECK IT

by Dan B. Miller

25 2-CUTTER ROCK BITS. Featuring bigger cutters with larger ball and roller bearings, the 2-Cutter is

in demand, especially for crooked-hole country where subsurface faults tend to throw the hole off vertical; straightening holes which have gone off vertical in any formation; and high-speed digging in strata ranging from soft to medium hard. These 2-Cutter bits usually are run with less weight; however, the bearing capacity has been developed to such a high degree of strength that ordinarily they will take the full load on any rig. The complete line consists of five models: the SS2C, for surface hole and soft, sticky shales where open tooth design is more effective; the S2C, for unconsolidated and broken formations particularly in soft shale where "balling up" presents no special problem; the M2C, also a long-tooth bit for unconsolidated formations, especially adapted to medium shales interspersed with layers of hard strata; the MH2C, for chippable formations in hard-formation, crooked-hole country where straight-hole bits are required from top to bottom; and the H2C, hard-formation bit, also a top-to-bottom bit used to maintain straight holes in difficult strata. *Globe Oil Tools Co.*

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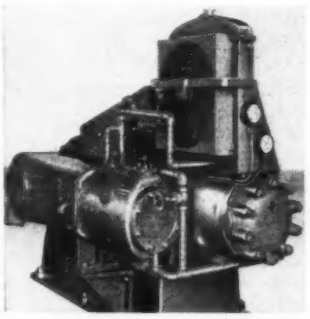

26 LORAIN MODEL A-9 COMPRESSOR. A new unit for compressing natural gas or for use in the liquefied-petroleum industry or other industry requiring gas under high pressure, is powered by a Lorain Model A multifuel engine. The single-stage compressor is driven through an overhung crankshaft. This arrangement reduces the 13-in. engine stroke to a 9-in. compressor stroke for high-pressure work and matches the compressor characteristics to engine horsepower output. The compressor cylinder has bottom discharge to prevent accumulation of gas condensates and is equipped with full force-feed lubrication including lubrication of the metallic rod packings. The unit weighs 11,100 lb. with standard accessories. *White-Roth Machine Corp.*

IT'S NEW ✓ CHECK IT

27 OIL-FIELD TRACTOR. Model FZMA has been developed to offer a compact, fast, highly mobile carrier for oil-field well-servicing equipment. The combination of the four-point positive-drive system, large single tires 14:00-20 with low air pressure of only 25 psi., the short 90-in. wheelbase, the high ground clearance of 16 in., the equal weight distribution on front and rear tires, a powerful 125-hp. six-cylinder motor of 404-cu. in. piston displacement, tractor-type transmission with six forward and two reverse speeds, results in a unit that has maximum ability to roll over soft, rough, or steep ground. On normal roadways, this unit can roll at speeds of from 30 to 40 m.p.h. Due to the high tractive effort, over 12,000 lb. at 3 m.p.h., this unit can be used effectively to haul trailers and other equipment. *Walter Motor Truck Co.*

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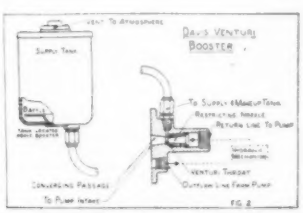

28 DAVIS BOOSTER is a simple solution to the problem of pressure loss at high speeds in geared, rotary vane and centrifugal pumps in the form of an input booster without moving parts. The booster, by use of a simple venturi to automatically accelerate the input flow at high speeds, assures a steady input of solid fluid to the impeller. It also eliminates efficiency loss due to entrained air. *F. W. Davis.*

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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29 AIR-FED HOOD is approved by the U. S. Bureau of Mines under Class C respirator for use in toxic dust and fumes. To eliminate bulk and rigidity, and to provide comfort and full freedom of movement, the hood is made of an extremely light-weight, highly flexible, rubberized fabric. It is also completely adjustable. It has an extra-large, clear-plastic window and its adjustable, plastic headband is mounted to the hood on a friction swivel to allow full vision up or down as the user moves his head. Air fed into the hood is tubed to each side of the face. Then diffused and filtered through cloth bags. Further protection is given by a soft cotton bib which acts as a baffle to keep out dust. It zips out for cleaning. *Chicago Eye Shield Co.*

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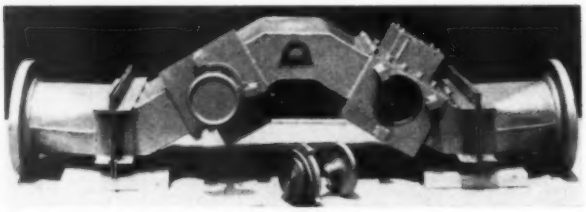
30 PRESSURE-TIGHT NONELECTRIC MAGNETIC SEPARATOR will remove stray iron from liquids,



slurries, and slips flowing in pipe lines that vary in diameter from 6 to 20 in. It is a flow-interrupting unit. This means that strategically placed baffles direct material flow 30° from the normal so that two stainless-steel plate-type magnets installed on opposite faces of the hump can set up a magnetic barrier in tandem. Performs satisfactorily with materials flowing at volumes from 50 to 250 cu. ft. per minute, depending, of course, upon consistency. Pressures up to 45 psi. can be safely employed. Neoprene gaskets insure against leakage. *Eriez Manufacturing Co.*

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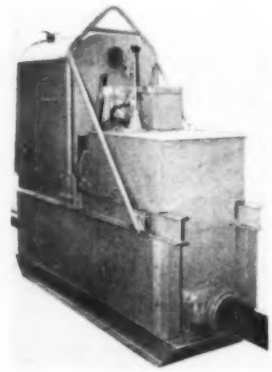
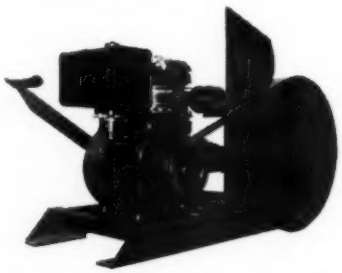


31 ONE-UNIT BORING MACHINE provides a modern, economical, fast method of drilling holes under roadways. The machine is compact, perfectly balanced, fully enclosed for safety and protection, and can be lifted by its bail into or out of a ditch or trench. Dimensions are 7 ft. by 24 in. thus making it possible to transport the machine in a small truck. It is equipped with a 100-hp. Ford V-8 engine with a large radiator. Bearings are lubricated through Alemite fittings on the outside of the frame. It has a four-speed transmission and is capable of handling small as well as large-diameter pipe. Bits are made in various sizes and the drill stem is made up in 10-ft. sections. *Riley Machine Works.*

IT'S NEW ✓ CHECK IT

32 IMPROVED ENGINE STARTER. A new, improved engine starter is for 5 to 90-hp. engines. One of the main improvements is the location of the pull rope on the outside of the starter, away from the engine. When the starter engine is running, the operator, by pushing a foot pedal, engages or disengages a revolving rotor on the rim of the engine's flywheel. Because operator engages rotor with a foot pedal, he has his hands free to make starting adjustments on the engine. The starter is available in five sizes and powered with either a single or twin-cylinder engine. *United Supply & Manufacturing Co.*



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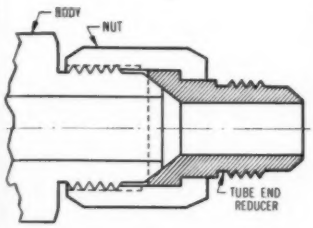
33 CAVINS REIN JARS are made of alloy steel, electric-welded, stress-relieved and heat-treated. The rein sections are milled from solid bar stock, leaving the web an integral part of the parent metal, and the open end of the rein welded to the solid stock, after assembly, on which the joints are cut. Stock sizes are 2, 2½, and 2¾ in o.d. with 24-in. stroke. Standard stock joint sizes are the same as for the 2, 2½ and 3-in. o.d. Cavins wire-line fishing jars. However, other diameters and other strokes up to 36 in., as well as other joint sizes, can be supplied on specifications. *Cavins Co.*

IT'S NEW ✓ CHECK IT

34 CAL-SEAL superstrength gypsum cement, developed exclusively for oil-field use, expands upon setting and is pumpable for most of its setting time. Although most widely used in shot tamps, where it holds the force of the shot down, yet protects the casing above, Cal-Seal is also effective in shutting off the flow of gas in blowouts, filling crevices and fissures that cause lost circulation, repairing split or corroded pipes, and holding limit and bridge plugs. A lineal expansion of .3 per cent results in an extremely tight plug wherever it is used in oil-well cementing. Sixty-minute Cal-Seal remains pumpable for about 50 minutes, then in the last few minutes of setting the slurry passes from a highly fluid state through a very viscous stage, finally becoming a dense solid. One hour after setting it attains a compressive strength of 2,500 psi. Despite this great strength, however, it is readily drillable. Its low permeability keeps out unwanted gas and well fluids. Setting time is adjustable to cover a range of 30 minutes to 2 hours. *Halliburton Oil Well Cementing Co.*

IT'S NEW ✓ CHECK IT

35 NEW TUBE-END REDUCERS for use with Triple-lok fittings, to step down to smaller tube sizes, are available in reducing sizes in the most used combinations. The new reducer greatly broadens the range because it can be used to convert any standard Triple-lok fitting (37° flare, steel) to a reducing type. Attached with the standard nut to the fitting tube end, the reducer provides a flared nose for the smaller tube size, and threads for the smaller nut. Made in steel, the reducer is available in eight sizes: ⅜, ½ and ¾ in. to ¼ or to ⅜ in. tube; ¾ in. to ½ and 1 to ¾ in. tube. Similarly, a brass tube-end reducer, in the same sizes, is available. *The Parker Appliance Co.*



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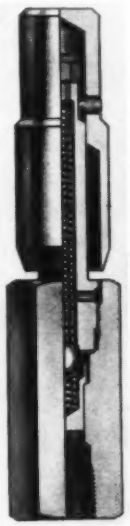
36 AIRLARM is a completely mechanical, fully automatic alarm unit for compressed-air systems. It sounds a shrill, continuous whistle when the pressure in the air system falls below the minimum predetermined pressure for safe operation of equipment. The Airlarm consists of a valve element which opens automatically when air line pressure drops below a preselected value, allowing escaping air to blow a whistle which is an integral part of the unit. The alarm continues to sound as long as the pressure is below that for which the device is set, and automatically stops when pressure is restored. *Airlarm.*



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37 CEMENT-MORTAR LINING SERVICE for old, small-diameter pipe lines, that gives new pipe-line performance can service water, gas, and oil pipe lines of 4-in. diameter and larger. Work can be carried out on pipe lines in place, without discontinuing regular service and all operations are handled by trained and experienced personnel. Process first cleans corroded matter and tubercles from inside pipe walls, and then applies a smooth cement-mortar lining to the walls. As a result, leaks are eliminated, flow coefficients are restored, and pumping costs are reduced. *Pipe Linings, Inc.*

IT'S NEW CHECK IT

38 TWENTY-FIVE TRACE UNITIZED PORTABLE SEISMOGRAPH is complete with 24 amplifiers, housed in one water-tight stainless-steel case weighing 55 lb. Amplifiers are high-gain AVC or expander type with individual gain controls, filter switches, and high-line eliminators. A builtin cable tester is provided on each amplifier channel. Unitized construction eliminates troublesome jumper cables, and the need of several men for carrying purposes. Wide choice of filters meet the requirements of all areas. New type circuit provides excellent record control. Other features include automatic trip circuit, accurate timing check, plug-in amplifier, excellent optical system. Hinged panel construction allows long access to internal wearing. Greater coverage and better detail allowed by 24 active traces. *Technical Instrument Co.*

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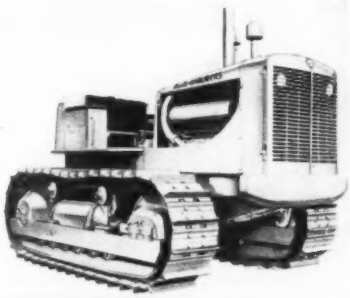
39 HD-20 TORQUE-CONVERTER-EQUIPPED TRACTOR. The 41,800 lb. of properly balanced weight, long, wide, sure-gripping tracks, and a new two-cycle GM 6-110 diesel facilitates handling the toughest jobs. This 660-cu. in. engine gives the HD-20 plenty of power to provide longer life, less maintenance, and increased production. Maximum horsepower can be utilized regularly and maintenance held to a minimum. A three-stage hydraulic torque converter eliminates most gear shifting and keeps the tractor working smoothly at higher average speeds. *Allis-Chalmers Manufacturing Co.*



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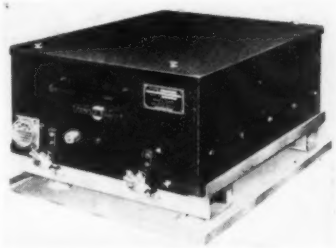
40 RUGGEDIZED MOBILE RADIO EQUIPMENT. Designed for adjacent channel operation, the MRT-5B communications unit combines a 10-12-watt FM transmitter-receiver and power supply in a single sturdy wrap-around housing. A shockmount is provided with this unit which will operate either of two radio channels in the 152-162 megacycle band. The Bendix MRT-5B is particularly adaptable for use by the petroleum industry because of its design which will permit installation on machines and vehicles where heavy shocks and vibration will be encountered. *Bendix Radio Division of Bendix Aviation Corp.*



IT'S NEW CHECK IT

41 NOISE-ABATING EQUIPMENT FOR NATURAL-GAS-USING ENGINES. New snubbers not only decrease noise from exhausts of internal-combustion engines but can also be used to reduce hazards of fire and explosion. The heavy-duty, side-inlet spark-extinguisher snubber can be used with or without fog jet which sprays a cooling mist of water vapor on the exhaust entering the snubber. Flame from the engine is cooled and extinguished while gas in the snubber is made noninflammable by the water fog. *Burgess-Manning Co.*

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W. L. McCLUSKY

W. L. McClusky, office manager, M. J. Delaney Co., Dallas, has been elected chairman of the Dallas-Fort Worth Chapter of the American Association of Oilwell Drilling Contractors. He succeeds F. W. Brigance, vice president and general manager, Rowan Drilling Co., Fort Worth.

Other new officers chosen for the year are: C. D. Smith, McQueen & Clevenger, Fort Worth, vice chairman; and Kye Trout, director of field and engineering activities of the association, secretary-treasurer.

E. K. Carey Drilling Co., Denver and McPherson, Kans., is drilling for Sheldon Brothers at 1 Holmquist, SW SW SE 20-15-13, a newly started wildcat test located a mile east of the discovery well of the recently opened Viola lime Smolan pool, Saline County, Kansas.

W. C. Young Drilling Co. is the contractor on a deep wildcat test which Placid Oil Co. has under way at 1 Mayer, Section 36, Block D, GC&SF Survey, 8 miles west of Sonora, Sutton County, West Texas.

Conroe Well Service Co., Conroe, Tex., is drilling a 6,600-ft. wildcat test for W. H. Bryant and associates at 1-A Oates, in the Edwin Stempson Survey, 3 miles south of Humble, Harris County, Texas Gulf Coast.

Dillard & Waltermire, Houston, are the contractors on a deep test being drilled for Continental Oil Co. at 1 Harris, Section 15, Block 3, WCRR Survey, 9 miles northeast of Iraan, Crockett County, West Texas.

Crow Drilling Co., Inc., Shreveport, will drill a 2,400-ft. test for Kenilworth Oil Corp. in the area 2 miles northeast of Lewisville, Lafayette County, Arkansas. Location is for 1 Sheffield, in the C SW SW 12-16s-24w.

Viersen & Cochran, Okmulgee, Okla., and Mercury Drilling Co., Tulsa, are to operate two rigs each for Bay Petroleum Co. in an expanded drilling program which the latter company is undertaking in development of Bartlesville sand production discovered early this year in the old Langston pool, Logan County, Oklahoma. All contracts are for 5,250 ft., which should carry the holes to the Wilcox.

Reserve Drilling Co., Casper, Wyo., has the contract for another test which Far West Oil Co. and Continental Oil Co. will drill in the South Glenrock area, in Converse County, Wyoming. Latest test is 1 Walinshaw-Doyle, in the C NE NW 17-33n-75w.

Helmerich & Payne, Inc., Tulsa, is moving a heavy rig to a wildcat location 4 miles west of Ardmore, Carter County, Oklahoma, where it will drill a 7,500-ft. test for Stanolind Oil & Gas Co. The test is 1 Woerz. Location is in the NW SE NW 31-4s-1e.

Reserve Drilling Co., Inc., Grea Bend, Kans., is the contractor on wildcat test which Nadel & Gussman are drilling west of the Luck pool Graham County, Kansas. Location is on the Dixon lease in the SW NW SW 12-8-22.

Coats & Hearrell Drilling Co., Gladewater, Tex., is starting a Paluxy wildcat test (1 Edwards) for W. M. Coats in the B. E. Gill Survey, 4 miles northwest of Winfield, northern Franklin County, eastern Texas. Contract depth is 5,000 ft.

Penrod Drilling Co., Shreveport, has a contract from Placid Oil Co., an affiliated company, for a 7,900-ft. Ellenburger wildcat test to be drilled on the latter's Swenson lease in Section 226, Block 1, H&GN Survey about a mile southwest of Spur, in southwestern Dickens County, Texas. Rig for the test is being moved in from the Salt Creek field.

Webster Drilling Co., Tulsa, has moved a rig to the Orlando area in northern Logan County, Oklahoma, where it will drill for Deep Rock Oil Corp. at 1-B Reed, NE SE SE 1-19n-2w. Location is 1½ miles west of the Orlando pool and about 2½ miles east and a little south of the Lucien pool.

Roeser & Pendleton, Inc., Fort Worth, has the contracts for the first two of five Pennsylvanian wildcat tests which James H. Snowden proposes to drill on the Carrie S. Dean Ranch in northeastern Dawson County, Texas. Locations for the initial two tests, one in Section 30, and the

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other in Section 32, Block 1, J. Poitevent Survey, are about 10 miles north of the Spraberry field.

Summitt Drilling Co., Tulsa, has the contract for a wildcat test which Deep Rock Oil Corp. has projected for the area about 4 miles southwest of Perkins, in northwestern Lincoln County, Oklahoma. The test is 1 Ralston, with location in the NE NE NE 20-17n-2e. It is about 1¼ miles south of the small Northeast Goodnight pool, nearest production.

Stag Drilling Co., Chase, Kans., has a string of tools running for J. C. Dozier on a wildcat test, 1 Boy, located in the NW SW SW 16-21-10, southwestern Rice County, Kansas. Nearest production is in the Raymond pool, 5 miles to the north.

Deep Fork Drilling Co., Tulsa, is starting the second well for Wilcox Oil Co. in the new gas area opened by the same operator southwest of Tryon, Lincoln County, Oklahoma. The new test, NW NE SE 28-16n-3e, is ½ mile south and ¼ mile east of the discovery well, 1 Potter, just completed as good for more than 7,000,000 cu. ft. of gas daily from Hunton lime, in which casing was perforated at 4,760-80 ft.

Frank Wood Drilling Co., Wichita Falls, Tex., has contracted with Sid Katz and R. H. Venable for the drilling of a projected 6,200-ft. Ellenburger wildcat test in northeast Stonewall County, Texas. Location for the test, 1 Dozier, is in the Ruthy Campbell Survey 50, 8½ miles west of O'Brien and just west of the Haskell County line.

H. E. R. Drilling Co., Oklahoma City, is moving a rotary rig to a wildcat location in the SW SW NE 9-16n-1w, 5 miles east of Guthrie, Logan County, Oklahoma, where it will drill a Wilcox sand test for its own account. Location is on its Davis lease, and is about 3½ to 4 miles from any other production.

ROTARY RIGS IN OPERATION*

(United States and Western Canada)

Area—	Week ended 11-27-50	Change week ended 11-20-50	Change week ended 11-28-49
Gulf Coast	585	+11	+ 44
W. Tex.-N. M.	804	— 5	+137
Ark.-N. La.-E. Tex.	163	+ 4	+ 4
Oklahoma	281	— 5	+ 35
Kansas-Nebraska	156	— 2	+ 25
Illinois-Eastern	125	—19	— 20
Rocky Mountains	127	— 2	+ 20
Pacific Coast	136	+ 2	— 10
Total United States	2,377	—16	+235
Western Canada	113	— 9	+ 28
Total	2,490	—25	+263

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States as a whole and the West Texas-New Mexico and Oklahoma-Kansas areas are shown by charts on pages 152 and 153.

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REFINING

Refinery Loans

Applicants must go to PAD, NSRB chairman says

WASHINGTON. — Refiners seeking loans from the Government for expansion or construction of new facilities for the production of products required for national defense will make application to the Petroleum Administration for Defense, it was announced by Chairman Stuart Symington of the National Security Resources Board in issuing regulations governing the use of loan funds provided in the Defense Production Act.

Under the terms of the act, loans to the amount of $600,000,000 may be made by agencies designated or established by the President "for the expansion of capacity, the development of technological processes, or the production of essential materials, including the exploration, development, and mining of strategic and critical metals and minerals." Financial assistance is to be extended, however, only to the extent that it is not otherwise available on reasonable terms.

Through RFC.—Loans will be made through the Reconstruction Finance Corp. following "thorough investigation" of the applications by the agencies to which they are submitted, Symington said.

Funds will be made available for expansion of capacity, development of technological processes or production of essential materials, but only if it can be shown that their use will speed production and deliveries or services to aid in carrying out government contracts for national defense.

To be eligible for loans, applicants must be able to show that funds for the purposes outlined are not otherwise available on reasonable terms. "In other words," the NSRB stated, "these loans will be granted only when the applicant is unable to obtain them from private financial sources, with or without government guarantee, or from other public sources on reasonable terms."

Feasibility.—Factors to be considered in passing on applications, Symington said, will include feasibility of the project, competence of the management, absence of more economical means for obtaining the scarce material or services, availability of necessary factors of production, effect upon small business and competitive enterprise, and the need to eliminate bottlenecks in production or distribution of materials or services needed for defense.

Antiknock Prices Raised

WILMINGTON.—Effective December 21, the petroleum-chemicals division of E. I. du Pont de Nemours & Co., Inc., will increase the price of tetraethyl-lead antiknock compound. The new price for motor-mix compound will be 37.81 cents a pound and aviation mix will be 41.44 cents a pound.

The new price for motor mix is approximately equivalent to 61.5 cents a pound of tetraethyl-lead content or 0.2237 cent a cubic centimeter.

NELSON REFINERY-CONSTRUCTION INDEX

Appears in the first issue of each month.
Explanation—Cost-imating No. 61, December 15, 1949, pages 91, 92.
Compiled by W. L. Nelson—Refinery Consultant—Tulsa.
Indexes of Individual Equipment Items—January, April, July, October.

INDEX (1946 = 100)

	1947	1948	1949	August 1950
Centrifugal pumps	109.0	120.0	118.9	133.7
Reciprocating pumps	128.5	138.1	144.6	154.4
Compressor	114.0	128.0	120.0	117.0
Engines	109.0	120.0	115.5	120.5
Motors	110.0	112.7	114.0	135.3
Transformers	116.0	116.0	116.0	123.4
Instruments	113.0	120.0	122.0	126.2
Miscellaneous Equipment average	114.2	122.1	121.6	130.1
Materials component	122.4	139.3	143.6	150.9
Labor component	113.5	128.0	137.1	146.1
Refinery construction index	117.0	132.5	139.7	148.0

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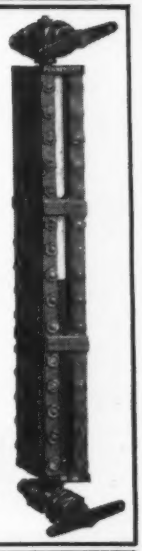

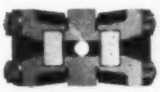

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Price advance by du Pont follows a similar move made by Ethyl Corp., to take effect December 11.

Phillips Gets AEC Job

BARTLESVILLE, Okla.—Developments that may later find important applications in the petroleum industry are looked upon as a possible result from Phillips Petroleum Co. being named by the Idaho Operations Office of the Atomic Energy Commission to become operator of a new materials-testing reactor being built in southeastern Idaho.

Announcement of the appointment was made by K. S. Adams, president of Phillips Petroleum Co., subject to completion of contract negotiations now in progress.

The new multimillion-dollar reactor is located on the Snake River plains west of Idaho Falls. It is one of three different types of reactors now being constructed at that site.

Phillips is undertaking the Atomic project, according to Adams, because it desires to enlist its scientific and managerial abilities in projects regarded as extremely important under present international conditions. Knowledge will be developed regarding materials of construction, new testing techniques, radioactive products, and control instruments which might later benefit the petroleum industry.

Sovaloid Rationing Lifted

NEW YORK.—Rationing of S/V Sovaloid C, made by Socony-Vacuum Oil Co., Inc., has been lifted due to expansion of facilities at the firm's Olean, N. Y., refinery, which are now reported adequate to meet all market demands.

The product has found a wide market for use in conventional vinyl compounds and plastisols as well as in nitrile rubber formulations. It is a light-bodied oil with unusually high specific gravity, a synthetic product made by chemical rearrangement of petroleum hydrocarbons.

According to Socony-Vacuum, it has exceptional solvent power for synthetic resins and for even the most oil-resistant synthetic rubbers. Its price is a third that of the cheapest ester plasticizers. To obtain similar physical properties it can be used in larger proportion than the esters, the company reports. Also it is said to produce nitrile rubber compounds with appreciably greater elongation at no sacrifice in tensile strength.

Hydrogenation Report

WASHINGTON.—The first volume of a report entitled "Bibliography of Pressure Hydrogenation—I," by J. L. Wiley and H. C. Anderson, industrial analyst and technical assistant, respectively, U. S. Bureau of Mines' research and development branch, Office of Synthetic Liquid Fuels, is now ready for distribution. Copies are available for $1.25 each through the Superintendent of Documents, Government Printing Office, Washington. The volume, dealing with the process of converting coal into oil, is identified as Bureau of Mines Bulletin No. 485.

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NATURAL GAS

Southeastern Project O.K.'d.

WASHINGTON. — The Federal Power Commission has authorized Southeastern Michigan Gas Co., Port Huron, to construct natural-gas pipeline facilities to serve the southeastern Michigan area. The same ruling directs Panhandle Eastern Pipe Line Co., Kansas City, to supply 5 million cubic feet of natural gas daily to the Michigan company, subject to 100 per cent curtailment during the coming winter.

Southeastern's project is estimated to cost $1,402,632. Approximately 55 miles of 12¾-in. pipe will be laid from Panhandle's facilities in the Clawson, Mich., area to Marysville, Mich., where the line will connect with existing distribution facilities to be acquired from Detroit Edison Co.

The Southeastern system, having a maximum daily capacity of 18 million cubic feet daily, will serve Port Huron, Marysville, St. Clair, and contiguous areas in St. Clair and Macomb counties.

Southeastern has scheduled completion of the pipe line in 2 months. To hasten supply of fuel for the winter heating season, the company plans to interconnect the line with the Detroit Edison system at New Haven, Mich., a point about midway between Clawson and Marysville, thereby converting a part of the Detroit Edison system to natural gas before completion of the entire project.

Midwestern Crisis Rises

WASHINGTON.—Natural gas for the Midwestern area has become involved in a knotty issue reported by the Federal Power Commission in determining deliveries to be made by Panhandle Eastern Pipe Line Co. The commission desires to know the volume needed by customers before it determines the available quantities and the rate schedules. The customers declare they must know the rate schedules before they can express the amount of natural gas they will purchase.

To expedite the solution, the commission has ordered a change in the order in which issues are to be considered at the early hearing. The original schedule provided for immediate consideration of Panhandle's application for proposed construction of facilities for delivery of natural gas to Ford Motor Co., and a related complaint from Michigan Consolidated Gas Co. for interruptible natural-gas service from Panhandle.

The commission has now decided to arrange hearings with respect to issues relating to the form of tariff and matters of rate and charges prior to a hearing with respect to the volume allotment.

Transco Tests Under Way

NEW YORK.—Final tests with water are now under way in Transcontinental Gas Pipe Line Corp.'s main line from Milltown, N. J., to Ellicott City, Md. Already completely tested and in use are 1,200 miles of main line from Houston to Ellicott City.

Tests of the company's meter station at 134th Street, in Manhattan, have been successful, as have those on the recently lowered Hudson River crossing, and the main line over the Palisades and down through the congested area of New Jersey.

After the successful tests were reported, Claude A. Williams, president of Transcontinental, announced that natural gas for the New York-New Jersey-Philadelphia area will be available this month.

New York Service Ordered

WASHINGTON. — The Federal Power Commission has authorized Tennessee Gas Transmission Co., Houston, to construct a sales meter station on its main line to Chautauqua County, New York, for the sale of natural gas to Republic Light, Heat & Power Co., Buffalo.

The ruling was opposed by the communities of Ripley, Booneville, and Baldwyn, Miss., on the ground it might jeopardize the supply of natural gas to markets there. The commission held that Tennessee Gas had available approximately 2,012,000 cu. ft. of natural gas daily in excess of the demand from the markets authorized.

Tennessee plans to sell a contracted demand quantity of 600,000 cu. ft. of natural gas per day to Republic which will resell the natural gas in Mayville, Westfield, and Chautauqua, N.Y.

United Case before FPC

WASHINGTON.—Witnesses from major companies have been summoned by the Federal Power Commission to testify regarding requirements for natural gas as involved in the application of United Gas Pipe Line Corp., Shreveport, La.

The companies from which testimony is required are Gulf Oil Corp., Rubber Reserve Co., Shell Oil Co., International Paper Co., Dallas Light & Power Co., Texas Electric Service Co., Houston Lighting & Power Co., Mississippi Power & Light Co., Louisiana Power & Light Co., City Public Service Board of San Antonio, Lower Colorado River Authority, Mobile Gas Service Corp., New Orleans Public Service, Inc., Southern Union Gas Co., Arkansas Louisiana Gas Co., Gulf Public Service Co., Texas Gas Transmission Corp., and Southern Natural Gas Co.

The commission also ordered United to submit cost studies supporting proposed rates for deliveries of natural gas to Mississippi River Fuel Corp., Texas Eastern Gas Transmission Corp., and Atlantic Gulf Gas Co. United is proposing to expand its pipe-line system in the Southwest to sell natural gas to Texas Eastern Transmission Corp., for resale to Algonquin Gas Transmission Co., Boston, as part of the supply for the proposed service of New England markets.

Kansas City Expansion

WASHINGTON.—The Central West Utility Co., Kansas City, has filed an application with the Federal Power Commission proposing to construct approximately 30 miles of pipe line in the Kansas City area in order to provide natural-gas service in the Clay County Missouri, area. The application further asks the commission to direct Cities Service Gas Co., Oklahoma City, to sell natural gas to Central.

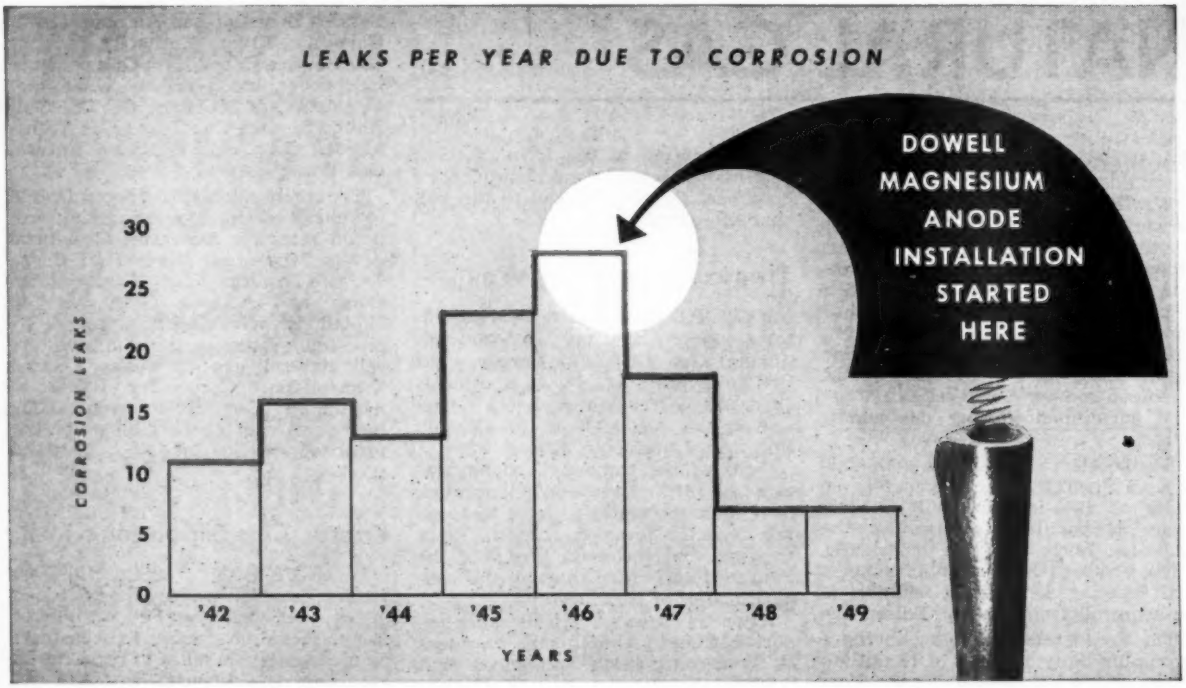
Central estimates the Clay County territory, a suburban residential development of metropolitan Kansas City, will provide a market for 15 million cubic feet daily within 5 years, and interruptible industrial demand will reach 6 million cubic feet daily. This is approximately 8 million cubic feet per day in excess of present requirements.

Central now obtains its natural gas from Panhandle Eastern Pipe Line Co., Kansas City, but contends this supply has been barely adequate in recent years and is insufficient to meet anticipated normal increases for the area. The application said that anticipated new industrial projects will substantially increase the population of the Clay County area and the demand for natural-gas service.

The proposed connecting line will be 12-in. in diameter, extending from Central's distribution system in Clay County to the Cities Service facilities near the southeast boundary of Kansas City. The line is estimated to cost $1,000,000, having a daily capacity of 30 million cubic feet of natural gas.

Further Expansion Planned

OMAHA.—Northern Natural Gas Co. estimates its pipe-line capacity will have to be increased by 200 million cubic feet of natural gas daily to meet the demand from its wholesale customers. Present capacity of the pipe-line system is 600 million cubic feet daily.



72% Fewer Corrosion Leaks

When DOWELL Magnesium Anodes Were Installed!

The reduction in leak rate graphed above was obtained on one section of 1000 miles of old bare pipe line after installation of a Dowell magnesium anode cathodic protection system. A 72% reduction in corrosion leaks and 60% reduction in oil losses were recorded. The results on this section were felt to be representative of the entire line.

The program, begun in 1947, called for the installation of approximately 7000 Galvo-Paks®, Dowell's packaged magnesium anodes, at all known "hot spots" and at the site of all new leaks as they appeared along the whole 1000 miles. Pipe line company officials estimated that the reduction in repair costs alone in the first 12 months after completion paid 85% of the total cost of installation.

While this is one of the largest cathodic protection programs yet undertaken, the results are not unusual. Sizable reductions in corrosion leaks are common when a properly designed system of Dowell magnesium anodes is installed. The degree of protection obtained will vary with the soil conditions encountered and the number of anodes installed.

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PIPE LINES

Service Lines Proposed

WASHINGTON.—Authority to build more than 500 miles of distributing pipe lines in Kansas and Nebraska has been asked from the Federal Power Commission by Kansas-Nebraska Natural Gas Co., Phillipsburg, Kans. Cost of the proposed expansion is estimated at approximately $5,201,331.

The project includes 16 miles of 12¾-in. loop line, and 73½ miles of 12¾-in. line replacing a like amount of existing 6⅝-in. and 8⅝-in. line. Approximately 5 miles of new 10¾-in. pipe line and 54 miles of 8⅝-in. line would extend the main distributing facilities. Smaller lines will include about 109 miles of 6⅝-in. pipe line and 53½ miles of 4½-in. line. Extending into the areas of smaller demand will be 101½ miles of 3½-in. pipe line and 102½ miles of 2⅜-in. line. These lateral lines will permit service to 37 communities in Nebraska.

The system will supply markets for natural gas in Palmer, St. Paul, Fullerton, Belgrade, Genoa, St. Edward, Cedar Rapids, Albion, Petersburg, Elgin, Oakdale, Neligh, Clearwater, Ewing, Orchard, Page, Inman, O'Neill, Plainview, Creighton, Osmond, Wausa, Bloomfield, Randolph, Coleridge, Laurel, and Hartington.

The town of Pierce, Neb., would be served wholesale by Kansas-Nebraska, and the company proposes to supply natural gas at town border stations to Central Electric & Gas Co., for resale in Newman Grove, Lindsay, Humphrey, Madison, Battle Creek, Meadow Grove, Tilden, Norfolk, and Stanton.

The expansion program also includes three new compressor stations at Holcomb and Albion, Kans., and Grand Island, Neb.; additional cooling equipment at the Scott City, Kan., compressor station; and a 44-million cubic feet dehydration plant at the proposed Holcomb compressor station.

Pipe-Line Traffic Up

WASHINGTON.—Reports filed with the Interstate Commerce Commission by 50 pipe-line companies showed that during the third quarter they originated or received from connections a total of 723,744,738 bbl. of oil compared with 567,981,756 bbl. in the corresponding period last year, the commission announced last week.

The total transportation revenue of the 50 companies, the ICC disclosed, was $107,922,579 for the quarter compared with $86,358,620 in 1949, an increase of 25 per cent. Eight companies, however, reported that their third-quarter transportation revenue was less than last year.

Pipe Laying Under Way

Trojan Construction Co., Tulsa, is laying pipe on the 50-mile line to carry gas from the Trawick field of Nacogdoches County, East Texas, to the Tennessee Eastman Corp.'s plant, now under construction 16 miles southwest of Marshall.

At last report, crews had laid about 15 miles of pipe line and were working on the Sabine River crossing near the plant site, in an effort to complete that phase of the project during dry weather and low water.

Completion of the line has been slated as Februay 1. Humble Oil & Refining Co. is developer of the Trawick field.

Burden Awarded Contract

HOUSTON.—R. B. McLaughlin, president of O. R. Burden Construction Co., Tulsa, has announced a contract award from Texas Pipe Line Co. to construct a products pipe line between Lawrenceville, Ill., and Mt. Vernon, Ind. The 56.5-mile line, costing approximately $100,000, will be 10¾-in. in diameter, and will parallel the Texas 6-in. products line now in operation.

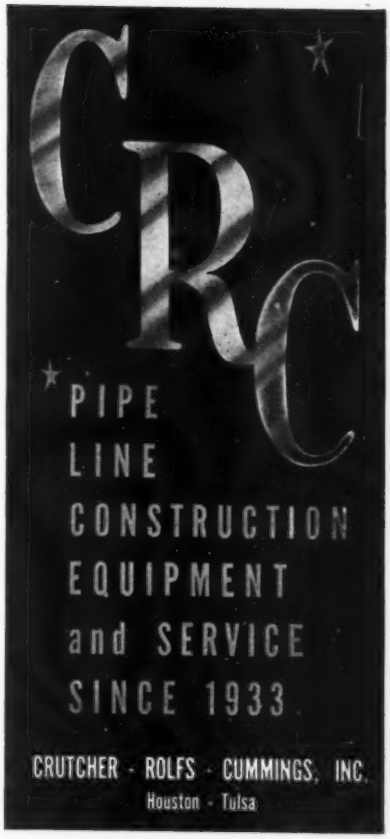
Work will begin in January to handle the difficult 4-mile crossing of the Wabash River while the low ground is frozen. Construction is estimated to take 3 months.

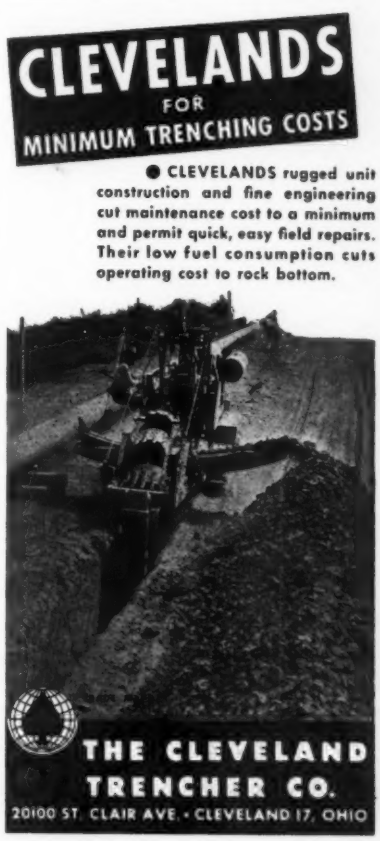
Novel Communication Method

SEATTLE.—A novel communication method which may eventually be put to use on petroleum and natural-gas pipe lines will be erected near Diablo Gorge, a mountain ravine north of here. The apparatus, a metallic signboard, will play a vital part in operation of one of two links comprising the PTM (pulse-time modulation) communication system now being manufactured by Federal Telephone & Radio Corp. for the Department of Lighting of the city of Seattle.

The system will be used for communication purposes between hydroelectric plants, located in a mountainous lake-area north of here, and substations in Seattle's municipally operated power-supply system.

Functioning as a passive reflector, the signboard will be strategically located so that the microwaves bouncing off its surface will be reflected to the next station, thus overcoming

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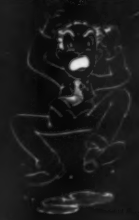

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the problem presented by a mountainous barrier to line-of-sight communication between the Diablo Gorge power plant, and a plant on Lake Diablo, 6 miles away. This phase of the contract will cause microwaves to literally "come 'round the mountain" and is said to be unique among PTM installations.

The system might hold possibilities of communication between pipe-line stations in particularly mountainous terrain.

Nonprofit Lines Planned

CHICAGO.—Parallel pipe lines skirting the Brandon Roads lock on the Illinois River will be constructed immediately by the Emergency Illinois Waterway Pipe Line Co. to avoid a winter blockade of fuel oil into the Chicago area.

Present estimates are that a minimum of 2,100,000 bbl. of petroleum products will be moved through the proposed lines, this amount having already been marked for flow. Last year in a similar emergency only 380,000 bbl. of crude oil were moved when the Lockport lock was closed 40 days for repairs.

The nonprofit company composed of 10 distributors in the Chicago area is completing plans for the construction of two 8-in. lines and one 10-in. line to bypass the Brandon Roads lock, located at the south end of Joliet, Ill., at Mile 286 on the Illinois River. Members of the organization are Standard Oil Co. (Ind.), Socony-Vacuum Oil Co., Inc., Shell Oil Co., Braun Brothers Oil Co., Consumers Co., Martin Oil Service, Pure Oil Co., Simpson Oil Co., Tri-o-lene Oil Co., and Western Oil & Fuel Co.

Pipe-Line Approval Sought

WASHINGTON. — Colorado - Wyoming Gas Co., Denver, has applied to the Federal Power Commission for authority to construct pipe-line facilities representing a capital investment of $771,850.

The company proposes to construct lateral lines and meter stations to supply natural gas for resale to the Public Service Co. of Colorado. Communities to be served include the towns of Westminster, Eastlake, Lafayette, Louisville, and Campion; also an unincorporated area called Mount Olivet.

In addition the company would supply the Greeley Gas & Fuel Co. with natural gas for resale to Pierce, Nunn, and Plattsville.

Other phases of the project include installation of an additional 2,400 hp. compressor at the company's Mesa station; the replacement of approximately 1½ miles of Fort Warren lateral with larger pipe; and the relocation of the Fort Warren meter station. Approximately 4 miles of the present 4-in. Golden lateral would be replaced with 8-in. pipe.

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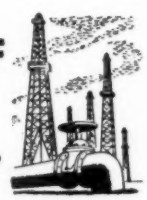

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Pipe-Line Sale Asked

WASHINGTON.—Sale of pipe-line facilities valued at $2,369,351 is involved in an application filed jointly with the Federal Power Commission by Monongahela Power Co., Fairmont, W. Va.; State Line Gas Co., Point Marion, Pa.; and Hope Natural Gas Co., Clarksburg, W. Va.

Hope Natural is proposing to acquire Monongahela's entire supply and distribution facilities serving natural-gas markets in Marion, Monongahela, Harrison, and Wetzel counties, West Virginia.

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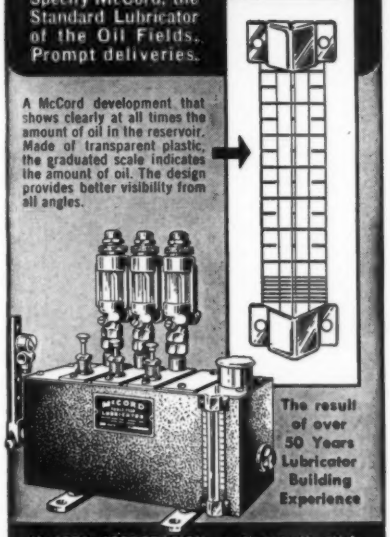

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Tulsa Construction Co. Started Last March

TULSA CONSTRUCTION CO. started business in March of this year with a background of pipe-line experience acquired by its executives in previous connections with contracting firms.

History.—The first contract of the company was made with East Tennessee Natural Gas Co. for the laying of several river crossings including those at the Tennessee River, Little Tennessee River, and the Clinch River, all in Tennessee. Shortly after this work was completed, Tulsa Construction laid lines for Knoxville Utility Co. to connect the East Tennessee Natural Gas Transmission trunk lines with the distribution system in the city of Knoxville.

Operations.—Currently Tulsa Construction is laying 56 miles of 8-in. products line from Lima to Springfield, Ohio, for Sohio Oil Co. and Shell Oil Co., Inc. At the same time two 5,500-ft. 12-in. river crossings are being laid across the Langville River in Arkansas for Mid-South Gas Co.

Equipment.—The company has equipment for one big-inch and one small-inch spread.

Personnel.—The company is headed by Lewis T. Price, president, who has had extensive experience in general contracting. B. C. Bates, Jr., vice president, was connected with J. R. Horrigan from 1930 to 1946 while Horrigan was manager of Williams Brothers Corp.'s Houston operations and then during the first 2 years when Horrigan was in business for himself. From 1947 to 1949 Bates was office manager and engineer for Bill Morrison Construction Co. The general superintendent of Tulsa Construction Co. is W. A. (Bill) Morrison.

The company headquarters are at 114 East Fifth Street, Tulsa.

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Basins of the Southwest

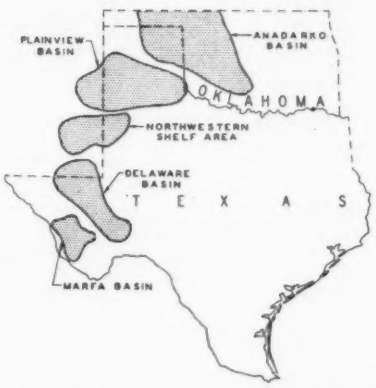
THE theme of the regional exploration meeting at Fort Worth *(see News Section, this issue)* was provided by five geological basins of the southwest: Anadarko, Plainview, Northwestern Shelf (a pre-Permian basin), Delaware, and Marfa.

Only a few significant accumulations of oil have been found in these basins despite tenacious exploratory efforts. But, the consensus of most of those geologists who have studied the limited data on the areas is that these basins contain great quantities of oil. They believe that a large portion of this country's undiscovered reserves lies within these basins.

You'll say: "If these scientists are right, why hasn't more oil been found to date?" The answer is simple enough: there haven't been enough deep holes drilled. "If there is so much oil present, why haven't there been more holes drilled?" The answer to that is: few prospects worthy of the large investments required for exploratory tests have been found.

"Why haven't worthy prospects been found here when they are constantly being found in other areas?" That was the main question considered at the meeting in Fort Worth. The answer is: they can be found and they will be found but it's going to be a tough fight. "Why?" Because of the attitude and nature of the Permian beds. Sediments from the highly saline seas of Permian time blanketed the existing structural features with flat-lying red beds and their characteristic gypsum and anhydrite members. "So?".

These Permian beds mask all evidence of traps at depth. They don't give the surface geologist a running chance. They are too thick to have core-drilling programs of much assistance. "What about the geophysicist—he knows how to find structures and wedgeouts that have no surface expression." That's right, but this area fights back more than most. The great velocity contrasts in the Permian beds kick back his seismic reflections from shallow depths and thus prevent deep penetration of his shot energy. The density differences in the shallow beds operate to superimpose unwanted anomalies on his gravity pictures. The great depths of the basement throughout much of



these basin areas make magnetometer maps more difficult than usual to interpret.

But, the stakes are high and some operators are determined to get their cuts. They have done and are continuing to do a great deal of geophysical work on these basins. They know they haven't time to wait for a new tool which may or may not become available some day. They are working for new approaches to the problem and new ideas on interpretation that will make currently available tools turn the table.

There have been some encouraging results obtained in these basins. Seismic refraction methods, normally a last resort, have been successfully employed to find a few producing structures on the Northwestern Shelf. Continuous effort has uncovered localities which for some unknown reason give good reflections. Anardarko basin's enormous Elk City field was found to lie in such an area.

Dry holes drilled in these basins have not discouraged geologists. From the records of these holes stratigraphers have found unconformities that indicate previously unguessed structural and stratigraphic possibilities. Exploratory work along the Matador archipelago has shown that Plainview basin was connected with Midland basin during the known reef-building time in that area and therefore may well contain oil-bearing reef buildups like those now being exploited to the south.

Philip C. Ingalls.

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

TEXAS GULF COAST.—Five miles north of Chapel Hill in Washington County, a new major Wilcox reservoir has been opened with completion of Edwin L. Cox and Jake L. Hamon 1 Bessie T. Hughes, W. R. Munson and E. R. Miller Surveys. On final test made through perforations at 9,364-69 ft., it flowed an estimated 200 bbl. of 36°-gravity oil per day through a 7/64-in. choke. Tubing pressure was 1,230 psi. and casing pressure 1,100 psi.

ROCKY MOUNTAIN AREA.—California Co. and Superior Oil Co. have joined in the wildcat drilling play throughout the Denver Basin and location was announced for five new wildcats in the area. Ohio Oil Co. has an apparent new gas discovery in the West Sidney wildcat, Cheyenne County, Nebraska. Designation has been asked for three new oil and gas pools, and four gas field extensions in the San Juan Basin.

WEST TEXAS.—Standard of Texas 1 Mrs. M. V. A. Smith, Dawson County Spraberry sand discovery, southwest of O'Donnell, was plugged back from the Pennsylvanian for completion between 7,935-76 ft. On 17-hour test, the well gaged 87 bbl. of oil, with a trace of sediment but no formation water. Midland County gained another Spraberry exploration at Ted Weiner 1-16 Driver, to be 22 miles southeast of Midland and 7 miles northeast of Humble's recent Spraberry discovery at its 1 Midkiff. Honolulu and Signal's 1-9 Burleson recovered 2,880 ft. of clean oil in reef lime between 9,272-9,322 ft., making it a likely prospect for the fifth well in new Ropes field of Hockley County.

XUM

Kansas

Meade County Wildcat Tests More Pay Zone

ADDITIONAL oil-saturated section has been cored and tested by Columbian Carbon Co. and associates in their 1 Novinger, rank wildcat in the C NW NW 26-33-30, western Meade County, in the Hugoton embayment area of southwestern Kansas.

Previously reported was a drill-stem test of an interval at 5,269-79 ft. in the Marmaton formation of lower Pennsylvanian age which showed considerable gas and resulted in a recovery of 500 ft. of clean oil and 100 ft. of muddy oil when the tester was pulled. Tester was open 68 minutes for the recovery.

Since then, with hole deepened in the prospective pay zone, two more tests have been made. The first, taking in an interval at 5,280-99 ft., had gas at the surface within 11 minutes after the tester was opened and yielded 790 ft. of clean oil and 120 ft. of muddy oil in the pipe breakdown. Gas flow was estimated at 119,000 cu. ft. per day. Tester was open 60 minutes. The second, taking in an interval at 5,528-88 ft., yielded only 15 ft. of oil-cut mud with tool open 48 minutes.

Operators are drilling ahead for a look at lower potentially productive horizons before attempting completion. This prospective well is 5 miles northwest of the East Adams Ranch gas pool, nearest production. Gas production there is from the Mississippian. Nearest oil production is the Kismet pool, 6 miles to the west in eastern Seward County. The latter pool, opened in 1948, has Pennsylvanian production.

Another wildcat, located in the northwest corner of Barber County, has given indications of good production from Viola lime but is being deepened to the Arbuckle. It is Nadel & Gussman and Aladdin Petroleum Corp. 1 Moffett, NE NE SE 8-30-15, 2 miles north of the Turkey Creek pool. In a 15-minute drill-stem test at 4,640-65 ft. with the bottom 14 ft. in Viola lime, topped at 4,651 ft. (—2,695 ft.), oil rose 1,860 ft. in the pipe.

In the active Mississippian development in the Landsdown area of eastern Kingman County, Pabco Drilling Co. 1-B Viney, SW SW SW 9-28-5, flowed 61 bbl. on a 21-hour gage, virtually assuring the opening of another new producing spot. The prospective well, located approximately a mile northwest of the comparatively recently opened Landsdown pool, is producing from casing perforations at 3,805-11 ft. Mississippian dolomite, the pay zone, had been topped at 3,786 ft. (—2,383 ft.), and drilled to 3,815 ft., where casing was run.

KANSAS SUCCESSFUL WILDCATS

Haskell County: Extension to Hugoton—Cities Service 1 Watson, NE NE NW 26-30s-32w, elev. 2,845 ft., 10,100,000 cu. ft. gas per day from regular Hugoton zones perf. at 2,680-90 ft., 2,634-54 ft., 2,606-24 ft., and 2,602-24 ft., TD 2,735 ft., Herrington 2,576 ft., upper Krider 2,604 ft., lower Krider 2,634 ft.

Stafford County: Petroleum, Inc. 1 Freihauf, NE SW SW 15-22s-12w, elev. 1,856 ft., pumped 284 bbl. oil per day from Lansing at 3,320-46 ft., TD 3,700 ft., anhydrite 640 (?) ft., Heebner 3,144 ft., lime 3,275 ft., Lansing-Kansas City 3,297 ft., Viola 3,557 ft., Simpson 3,602 ft., Arbuckle 3,672 ft.

KANSAS WILDCAT FAILURES

Barton County: Wakefield et al 1 Tockert, NE NE SW 23-17s-12w, elev. 1,856 ft., dry, TD 3,355 ft., anhydrite 702 ft., Topeka 2,735 ft., Heebner 2,958 ft., Dodge 2,978 ft., lime 3,065 ft., Lansing-Kansas City 3,080 ft., Arbuckle 3,340 ft.

Musgrove 1 Stockopf "C," NW NE NW 29-17s-13w, elev. 1,900 ft., dry, TD 3,402 ft., anhydrite 857 ft., Heebner 3,090 ft., Lansing-Kansas City 3,176 ft., Arbuckle 3,377 ft.

Cowley County: Combs-Oakes et al 1 Starlin, CWL SE NW 18-30s-4e, dry, TD 2,894 ft., Stalnaker 1,950 ft., Kansas City 2,349 ft., Mississippi lime 2,880 ft.

Ellsworth County: Dozier 1 Kroesch, SE NE SE 33-17s-9w, elev. 1,748 ft., dry, TD 3,269 ft., Heebner 2,733 ft., lime 2,850 ft., Lansing-Kansas City 2,878 ft., Arbuckle 3,258 ft.

Graham County: Cook-Galloway 1 Holzhauer, SE SE NE 24-10s-21w, elev. 2,265 ft., dry, TD 3,888 ft., anhydrite 1,373 ft., Topeka 3,298 ft., Heebner 3,504 ft., Toronto 3,523 ft., Lansing-Kansas City 3,542 ft., Sooy 3,820 ft.

Marion County: McJilton 1 Crites, SE SE SW 26-22s-4e, elev. 1,421 ft., dry, TD 2,717 ft., Lansing 1,851 ft., Kansas City 2,039 ft., Pennsylvania Sooy 2,444 ft., Mississippi chert 2,459 ft., Kinderhook 2,544 ft., Hunton 2,630 ft., Viola 2,710 ft.

Phillips County: K&E-Stableford 1 Jackson, SW SW NW 36-1s-19w, elev. 2,239 ft., dry, TD 3,857 ft., Heebner 3,398 ft., Lansing-Kansas City 3,424 ft., Simpson sand 3,738 ft., Arbuckle 3,824 ft.

Reno County: Milland-Allison 1 Miller, SE SE SE 8-25s-8w, elev. 1,643 ft., dry, TD 5,350 ft., Lansing-Kansas City 3,307 (?) ft., Mississippi lime 3,856 ft., Kinderhook 3,942 ft., Viola 4,190 ft., Simpson shale 4,226 ft., Simpson sand 4,230 ft., Arbuckle 4,315 ft.

Rice County: National Associated Petroleum 1 Boldt, NE NE NE 30-18s-9w, elev. 1,726 ft., dry, TD 3,320 ft., anhydrite 400 ft., Heebner 2,758 ft., Lansing-Kansas City 2,911 ft., Sooy 3,250 ft., Arbuckle 3,288 ft.

Russell County: Stearns 1 Shaffer, NW NW SW 29-13s-12w, elev. 1,798 ft., dry, TD 3,386 ft., anhydrite 748 ft., Kansas City 2,970 ft., Sooy 3,310 ft., Arbuckle 3,354 ft.

EASTERN NEBRASKA SUCCESSFUL WILDCAT

Richardson County: Extension to Barada—Peters et al 1 Fritz, NW SW SE 11-2n-16e, elev. 1,078 ft. RB, pumped 300 bbl. oil per day from Hunton at 2,424-50 ft., TD; Mississippi lime 2,065 ft.

EASTERN NEBRASKA WILDCAT FAILURES

Lancaster County: Pyramid 1 Miles, NE NE NW 19-9n-5e, dry, TD 1,950 ft.

Richardson County: Skelly 1 Wiltze, NW SW NE 19-3n-17e, elev. 1,088 ft. RB, dry, TD 2,600 ft., Mississippi lime 2,122 ft., Hunton 2,502 ft.

Seward County: Nebraska Drillers 1 Markle, SE SE NE 23-9n-4e, dry, TD 2,277 ft.

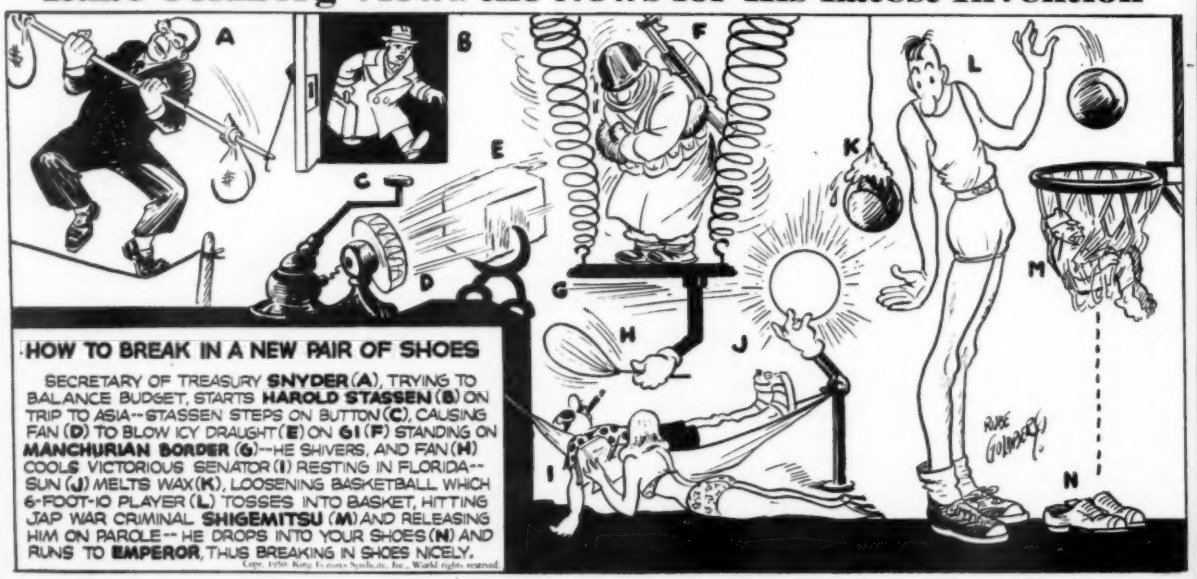
SOUTH CENTRAL NEBRASKA WILDCAT FAILURE

Harlan County: Imperial 1 Peschel, SW SW SW 33-1n-20w, elev. 2,163 ft. DF, dry, TD 3,822 ft., Codell 660 ft., anhydrite 1,885 ft., Heebner 3,360 ft., Lansing-Kansas City 3,380 ft., Marmaton 3,669 ft., Sooy 3,739 ft., Simpson 3,755 ft., Arbuckle 3,769 ft.

MISSOURI WILDCAT FAILURE

Atchison County: C. F. Bell 1 Hunter, NW NE NE 16-6n-41w, elev. 917 ft., dry, TD 2,500 ft., Lansing 620 ft., base Hertha 917 ft., Pawnee 1,005 ft., lime 1,727 ft., St. Genevieve 1,773 ft., St. Louis 1,878 ft., Spurgeon 1,885 ft., Warsaw 1,910 ft., Burlington 1,959 ft., Chouteau 2,025 ft., Hunton 2,350 ft.

Rube Goldberg Views the News for His Latest Invention



HOW TO BREAK IN A NEW PAIR OF SHOES

SECRETARY OF TREASURY **SNYDER** (**A**), TRYING TO BALANCE BUDGET, STARTS **HAROLD STASSEN** (**B**) ON TRIP TO ASIA--STASSEN STEPS ON BUTTON (**C**), CAUSING FAN (**D**) TO BLOW ICY DRAUGHT (**E**) ON **61** (**F**) STANDING ON **MANCHURIAN BORDER** (**G**)--HE SHIVERS, AND FAN (**H**) COOLS VICTORIOUS SENATOR (**I**) RESTING IN FLORIDA--SUN (**J**) MELTS WAX (**K**), LOOSENING BASKETBALL WHICH 6-FOOT-10 PLAYER (**L**) TOSSES INTO BASKET, HITTING JAP WAR CRIMINAL **SHIGEMITSU** (**M**) AND RELEASING HIM ON PAROLE--HE DROPS INTO YOUR SHOES (**N**) AND RUNS TO **EMPEROR**, THUS BREAKING IN SHOES NICELY.

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North Central Texas

Three Discoveries Highlight West Central Texas Work

WICHITA FALLS.—The week's developments in West Central Texas included two Strawn discoveries making completion tests, and a Canyon reef limestone discovery ready to complete. The Canyon well is Seaboard Oil Co. 1 W. F. Edwards, Stonewall County wildcat, 11 miles southwest of Aspermont. After plugging back to 5,338 ft., a drill-stem test between 5,215-5,338 ft. had gas in 74 minutes and flowing oil in 3 hours. In flowing to tanks, the well produced 50.88 bbl. of oil in 6½ hours, through ½-in. choke, and with a shakeout of 3½ per cent basic sediment. A small water content was said to be drilling water. The well unloaded while pipe was being pulled and final recovery was 1,570 ft. of oil, 180 ft. of mud, and 630 ft. of water. Plans were to complete in open hole, from the interval tested.

Sun Oil Co. 1 Susie F. Featherstone, Nolan County Strawn discovery, completed on the pump for 22½ bbl. of oil a day, with no water, from pay at 6,168-92 ft. Sun's 1 Eunice Parramore, southwest of Maryneal, was running a test from 7,366-80 ft., in a dolomite section which showed fluorescence while drilling.

In southeast Throckmorton County, Bridwell Oil Co. completed its 1 M. A. Tuttle as a Strawn discovery, pumping 42½ bbl. of oil a day from pay between 3,194-3,202 ft. The well was drilled to 4,686 ft., in the Mississippian, then plugged back to 3,202 ft. Operators filed application to drill three offsets. These are to be the 2, 3, and 4 Tuttle, and offset the discovery to the southeast, northwest, and southwest, respectively. Proposed depth on the three new wells was 3,300 ft.

Texas Pacific Coal & Oil Co. 1 May Sears "A," in 74-20-T&P, Nolan County, completed on the pump for 179.7 bbl. of 42°-gravity oil a day, with no water. The Ellenburger discovery entered that formation at 5,950 ft. on elevation of 2,034 ft., and found pay, by drill-stem testing, to 6,014 ft.

A. R. Dillard 1 Frank Bunting, wildcat test 2 miles east of Antelope field in Clay County, completed as a Strawn sand discovery from pay at 4,358-4,410 ft. On potential test it pumped 114 bbl. of oil a day.

In the new Bowie Viola limestone field of Montague County, Texas Co. 1 Mrs. Anna Hoeldtke flowed a total of 35 bbl. of oil in 35 minutes on a drill-stem test of the lime from 6,423-73 ft. Gas came to the surface in 12 minutes and oil in 22 minutes. Bottom-hole pressure was 3,150 psi. Operators reversed the oil in the pipe into pits and there was no recovery.

Charles E. Morrison 8 Prideaux, wildcat 3 miles northwest of Markley in Archer County, recovered 30 ft. of oil-cut mud, 200 ft. of gas and 2 gal. of free oil a 1-hour test in sand from 4,184-95 ft. Operators were running 7-in. casing for production tests.

Greenbrier Oil Co. 1 H. O. Prideaux "D," extension test south of Windthorst, was running pipe after recovering 1,980 ft. of free oil, with no water, on a 1-hour drill-stem test in sand from 3,678-84 ft.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Archer County: L. T. Burns 4 O. L. Bishop, Meade L. M. Pasture Subd., 3½ mi. E Megargel, TD 3,945 ft., Strawn pay 3,930 ft., flowed 124.84 bbl. 42°-gravity oil in 5 hr., 12/64-in. choke, CP 240 psi., TP 100 psi., GOR 550 cu. ft.

Jones County: Yeatman Drilling Co. 1 S. C. Potts, 6-1-T&NO, 2 mi. SW Anson, TD 2,522 ft., elev. 1,797 ft., Flippen pay 2,516 ft., flowed 147.3 bbl. 37.7°-gravity oil a day, ¼-in. choke, GOR 300 cu. ft., TP 45 psi.

Knox County: Stanolind Oil & Gas 1 Icelana Clonts, D. G. Burnett Sur., 7, A-15, 5 mi. NE Knox City, TD 4,240 ft., elev. 1,441 ft., Palo Pinto pay 4,175 ft., flowed 129.7 bbl. 38°-gravity oil a day, 11/24-in. choke, CP 225 psi., TP 125 psi., GOR 230 cu. ft.

Palo Pinto County: Palo Pinto Oil & Gas Corp. 1 William Sanders, 43-2-T&P, 11 mi. N Strawn, TD 1,285 ft., pay 1,268 ft., flowed 37 bbl. 42°-gravity oil a day.

Shackelford County: C. E. Townsend and Wm. H. Bass 1 Karl Fritz Leschber, Sec. 536, TE&L, 7 mi. NE Albany, TD 446 ft., pay 437 ft., pumped 6.82 bbl. 38°-gravity oil a day.

NORTH CENTRAL TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Archer County: F. S. Hutcheson 1 J. J. Perkins "Deep," Jose Ostane Sur., 3 mi. N Archer City, dry, TD 4,004 ft., elev. 970 ft., KMA lime 3,344-71 ft.

G. E. Kadane & Sons 1 W. C. Frey "O," Palo Pinto CSL, 3½ mi. NE Dundee, dry, TD 4,383 ft.

L. T. Burns 1 J. P. Knezek, Wm. Ward Sur., 6 mi. N Megargel, dry, TD 5,336 ft., Gunsight 1,502-14 ft., Mississippian 5,321 ft.

Brown County: Sciscoe & Stone Drilling Co. 1 J. J. McAden, Sec. 185, Watkins Nobles Sur., 13½ mi. S Brownwood, dry, TD 1,308 ft., elev. 1,375 ft., Marble Falls 1,024 ft.

Clay County: F. L. and J. L. Randel 1 Jones-Baber, Bacons Subd., 4½ mi. SW Charlie, dry, TD 1,360 ft.

Cooke County: Britton Drilling Co. 1 J. W. Kirby, Fannin CSL, 1 mi. W Callisburg, dry, TD 5,936 ft., elev. 822 ft., Strawn sand 3,744 ft., lime 5,300 ft., Simpson 5,410 ft., Joins 5,670 ft., Oil Creek sand 5,560 ft., Ellenburger 5,754 ft.

Coleman County: John E. Taylor 1 Shields, Blk. 7, R. H. Overall Sur. 76, 3½ mi. SW Santa Anna, dry, TD 2,410 ft., Ran-

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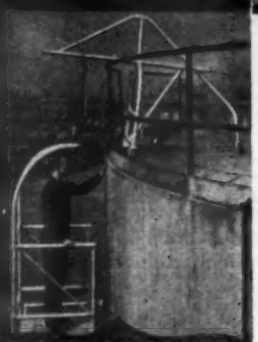

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Erath County: Princess Oil Corp. 1 B. Lewis, MEP&P Sur., 6 mi. SW Lingleville, dry, TD 3,420 ft., elev. 1,331 ft., Marble Falls 2,783 ft., Ellenburger 3,374 ft.

Haskell County: Pan American Production Co. 1 A. C. Deats, Mary Jones Sur., 3 mi. W Rule, dry, TD 5,935 ft., elev. 1,576 ft., conglomerate 5,847 ft., Mississippian 5,874 ft.

Jack County: Coston & Clive 1 T. H. Cherryhomes, N. Gragg Sur., 8 mi. SE Jacksboro, dry, TD 5,215 ft., conglomerate 4,854-64 ft.

Daniel Oil Co., Inc. 1 L. Anderson, E. Merando Sur., 2½ mi. W Joplin, dry, TD 4,438 ft., conglomerate 4,380-4,414 ft.

Jones County: Hickok & Reynolds, Inc. 1 Mrs. G. H. Boaz, Austin & Williams Sur. 338, 5 mi. SE Hamiu, dry, TD 3,218 ft., elev. 1,673 ft.

Taylor County: Kerr-McGee Oil Co., Inc. 1 L. Smith, R. Williams Sur. 403, 1 mi. E Ovalo, dry, TD 4,926 ft., elev. 1,971 ft., Flippen sand 2,105 ft., Cisco 2,295 ft., Gunsight 2,785 ft., Palo Pinto 3,500 ft., Gray 4,293 ft., Gardner sand 4,155 ft., dolomite 4,807 ft.

Lester & Duffield, Inc. and Billups 1 G. C. Stewart, D. B. Corley Sur., 4 mi. SW Abilene, dry, TD 4,876 ft., elev. 1,788 ft., Cook lime 2,106 ft., Swastika 2,495 ft., Caddo 4,656 ft., Ellenburger 4,836 ft.

West Central Drilling Co. 2 F. T. Hogan, Blk. 10, Lge. 145, Guadalupe CSL, 8 mi. S Merkel, dry, TD 3,215 ft., Flippen 2,651 ft., Hope 2,776 ft., reef 3,212 ft.

Wilbarger County: Craig & Neal 4 W. T. Waggoner, 37-4-H&TC, 7 mi. SW Harrold, dry, TD 1,937 ft.

Young County: L. T. Burns 1 Loyd Echols, Sec. 2,443, TE&L Sur., 2 mi. NE Spring Creek, dry, TD 5,198 ft., some free oil 5,142-50 ft.

South Louisiana

New Field Indicated In Acadia Parish

NEW ORLEANS.—Two and one-half miles west of South Bayou Mallet field, Acadia Parish, Bates & Cornell 1 August Leonards, 29-7s-1e, wildcat, indicates the possibility of a new field. The well is at a total depth of 9,976 ft. with 7-in. casing set to 9,814 ft. Several oil and gas shows are reported in the well. Between 9,945-66 ft. clean gas and oil sands have given trouble trying to blow out. The sands flowed considerable 41°-gravity oil. Operators pumped 16-lb. mud in the hole for control, but failed. The bottom hole has been cemented up and operators are now preparing to drill out.

In Assumption Parish, Humble Oil & Refining Co. 1 Nickolas Kafoury, wildcat, 35-13s-13e, is at total depth of 11,719 ft. in sand and shale. Operators lost circulation and are now in the process of conditioning mud.

Gulf Refining Co. has completed 1-H Miami Corp., 35-13s-3w, Cameron Parish, for the second producer in the new Lake Misere field. Through perforations at 9,947-56 ft., the well flowed 38 bbl. of oil plus 2,415,000 cu. ft. of gas per day through 12/64-in. choke. Flowing tubing pressure was 3,600 psi. and gravity of the oil was 44.6°.

Placid Oil Co. is making hole below 16,068 ft. in its Lafourche Parish wildcat, 1 City of New Orleans, 22-23n-22e, 2 miles west of the Bay Marchand Prospect and 5 miles northeast Timbalier Bay production. The well originally was drilled to 14,767 ft. in

third sidetracked hole and operators resumed deepening on July 11, this year.

In Avoyelles Parish, Gulf Refining is drilling below 6,050 ft. in its second try for the area 3 miles south of Saline Lake field. The new try is 2 Ben J. Altheimer, 24-4n-4e. located 1¼ miles southeast of the 1 Altheimer dry hole, which recovered oil from a section in the Wilcox at 5,932-38 ft., but failed to be commercial.

SOUTH LOUISIANA WILDCAT FAILURE

Calcasieu Parish: Sun Oil Co. 1 Brooks, 20-10s-12w, 1½ mi. N and 2 mi. E of Toomey townsite, dry, TD 11,346 ft.

Permian Basin

Good Shows Recovered In Midland Wildcat

MIDLAND.—Houston Oil Co. 1 Golladay, Midland County wildcat southeast of Midland, reported good shows of oil and gas on a drill-stem test in the Dean sand. Top of the zone was 8,720 ft., minus 6,031 ft. and the 4-hour test was run from 8,460-8,865 ft. Gas surfaced in 1 hour and 7 minutes, and recovery was 450 ft. of heavily oil and gas-cut mud. Operators drilled ahead below 8,915 ft., in sand and shale.

Ralph Lowe 1 Hill was drilling ahead in Pennsylvania limestone and shale at 11,004 ft. at last report. J. K. Dobbs 1 Bryant was drilling at 8,226 ft., and C. W. Murchison 1 Joe Cannon was drilling below 12,620 ft. The latter wildcat recovered 150 ft. of drilling mud on a 38-minute test in the Fusselman section from 12,464-619 ft.

James H. Snowden and others have staked two offsets to their 1 Fasken, discovery well of Germania field, about 14 miles east of Midland. The new tests are the 2-7 and 3-7 Fasken, being northeast and southwest offsets, respectively. Both operations have been slated to 8,500 ft., as Spraberry sand tests.

Gulf Oil Corp.'s 2-E-B Glass, Martin County wildcat, prepared to drill-stem test in the Spraberry to 7,924 ft., after recovering a core from 7,889-7,924 ft. which had a small amount of bleeding oil, and gas, in the bottom 1 ft.

Plymouth Oil Co. announced location for an 8,000-ft. Spraberry wildcat for Martin County, which is to be the 1 Jefferson Davis, in 17-35-1s-T&P, 2½ miles east of Stanton. Lee Brown Drilling Co. was moving in material.

According to tentative identification, Sunray and Seaboard's 2 L. R. Spires, south outpost to Spires Strawn field of Kent County, had prospects of oil from a lower Pennsylvanian zone than the field's regular pay. A drill-stem test from 6,961-97 ft. had gas in 3 minutes and in 2 hours recovered 570 ft. of heavily oil and gas-cut mud. A 3-hour test at 6,978-7,017 ft. had gas in 3 minutes and recovered 500 ft. of heavily oil and gas-cut mud. Operators were pulling the testing tool after a 3-hour test from 7,038-65 ft. Operators' top on the Caddo limestone was 7,041 ft.

In Borden County, P. R. Rutherford 1 Murphy, northern edge well for Reinecke field, was showing for commercial production from the reef limestone, with a possible 44-ft. pay section. Top of the reef was 6,934 ft., or minus 4,616 ft., which was calculated to be 44 ft. above the water table in the field. Drill-stem test from 6,929-44 ft., total depth, had gas in 33 minutes and recovered 450 ft. of oil and 120 ft. of oil and gas-cut drilling mud. No water was reported. Operators planned to set casing on top of the reef and acidize for completion attempt. The well is 4,500 ft. north of nearest production.

Shell Oil Co. 1 Sterling, Borden County wildcat northeast of Knapp, was running electrical surveys after finding oil, gas and considerable salt water in the Pennsylvanian. Drill-stem test from 6,755-74 ft. recovered 240 ft. of oil and gas-cut mud, 90 ft. of water and mud with some oil, and about 4,600 ft. of salt water.

Between Reinecke and East Vealmoor fields, Amerada Petroleum Corp. 1 Montgomery was drilling below 6,749 ft. in the Wolfcamp, following a drill-stem test from 6,655-6,748 ft. which recovered gas and salt water, and a trace of dead oil.

Runnels County had two extension wells in the completion stage. Southeast of Winters, Jim McMurray 1 Rogers became the second well and extended Gardner sand production approximately 1 mile north of John Messenger 1 Mrs. Nora Jones, discovery well. The 1 Rogers completed for 203 bbl. of 46°-gravity oil a day from pay at 4,073-83 ft., flowing through 20/64-in. choke.

Susan Oil Co. 1 Pinegar, 1 mile northwest extension or discovery, was ready for testing and was waiting on storage. The well kicked off ofter being swabbed 4 hours, and flowed into pits for 45 minutes through 20/64-in. choke. Unofficial estimates on the flow ranged up to 750 bbl. daily. Pay section had been treated with Hydrafrac through casing perforations at 4,386-92 ft.

In northeastern Howard County, Fred M. Manning, Inc., 1 Chester L. Jones prepared to plug back to the Pennsylvanian for completion attempt, after recovering 3,500 ft. of black salt water with no shows, on a drill-stem test at 8,441-53 ft. in shale and chert which was thought to be Mississippian. Earlier tests indicated oil, with some salt water, from 7,709-30 ft.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

McCullouch County: Clinton F. Smith 1 G. W. Davenport, J. F. Martin Sur. 1136½, 5½ mi. NW Brady, dry, TD 900 ft.

Runnels County: Kingford Oil Co. 1 J. W. Barr, C. Montez Sur. 230, 3½ mi. NW

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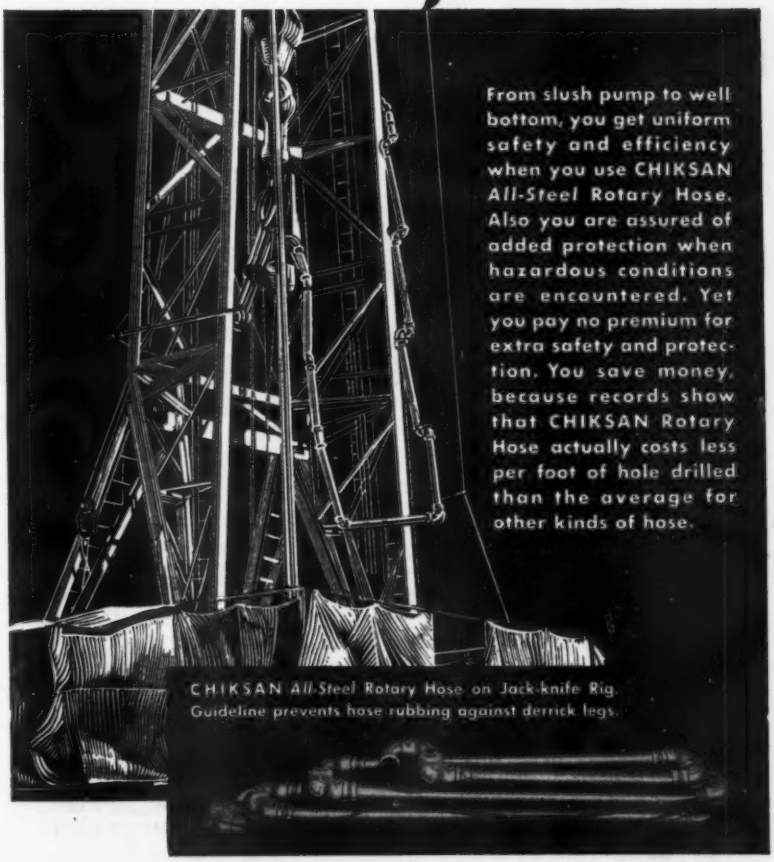

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Giesecke, dry, TD 3,503 ft., elev. 1,644 ft. upper Capps 3,150 ft.

Sterling County: Carter-Gragg Oil Co. 1 R. W. Foster, 10-13-SPRR, 7½ mi. SW Sterling City, dry, TD 5,560 ft., elev. 2,476 ft., San Andres 1,620 ft., Glorietta 3,320 ft.

Salt Dome Production Co. 1 E. R. Foster and Fay Hildebrand, 20-12-SPRR, 1 mi. SE Durham field, dry, TD 1,498 ft.

SOUTHEAST NEW MEXICO

HOBBS.—Stanolind Oil & Gas Co. 3 South Mattix unit, southeast extension to Fowler Ellenburger field of Lea County, made a second flow of oil on drill-stem test. The test was run from 9,936-80 ft. and time was 4½ hours. Gas came to the surface in 10 minutes and oil in 1 hour. The well was cleaned into pits for 30 minutes, then gaged 88 bbl. of 43°-gravity oil in 3 hours. Gas-oil ratio was 1,000 cu. ft. Operators reversed oil out of the drill pipe, cored ahead to 10,032 ft., and tested between 9,985-10,032 ft. Gas showed in 7 minutes, mud in 22 minutes, followed almost immediately by oil. A 2-hour gage tanked 123 bbl. of 45°-gravity oil. It was to core ahead.

Appalachian Field

Deep Snow Shuts Down Drilling Operations

PITTSBURGH. — The deep snow in the Appalachian fields has caused a shutdown of practically all drilling. Very few reports came through. None were received on deep wildcat drilling in North Central or Southwest Pennsylvania. No new work was noted in this state.

In West Virginia, Tolcott district, Summers County, Godfrey L. Cabot, Inc. 1330 S. H. Pence is drilling at 2,809 ft. In Steele district, Wood County, Davis-Kelly Oil & Gas Co. 1 Charles D. and Audrey Post is drilling at 2,330 ft.; Glen W. Roberts 1 Robert W. Ayers is shut down at 5,266 ft., testing; United Carbon Co. 1740 Wattie R. Ayers is drilling at 5,008 ft., and United Fuel Gas Co. 6651 Ralph Ayers is drilling at 1,635 ft.

California

Search for New Reserves Is Accelerated

LOS ANGELES. — In response to recent increases in heavy-crude prices and a heightening demand for petroleum products on the West Coast, California operators in recent weeks stepped up their search for new oil reserves. And as has always been the case when added oil is needed, the efforts are being successful.

At Edison Groves in the San Joaquin Valley, Richfield Oil Corp. appears to have opened a new heavy-oil field between the Race Track Hill and Ant Hill fields. The wildcat, its 1 Shields-Arms in NE NE 32-29s-29e, on a formation test at 3,510-56 ft., flowed at the estimated rate of 200 bbl. daily. Crude was about 12° gravity and was cut with about 12 per cent water.

The discovery sand, topped at about 3,590 ft., lies above the Pyramid Hills and Vedder sands, principal pays in Rack Track Hill 1½ miles to the southeast. With 8-in. casing cemented at 3,503 ft., Richfield was preparing to deepen the wildcat to check these deeper pays.

Two 1950 discoveries in the vicinity of Castaic Junction, Los Angeles County, appear to be in line for new oil zones. At Castaic Creek, discovered last August by Texas Co. 1 Honor Farm for an initial production of 1,400 bbl. daily, Texaco 2 Honor Rancho made a good oil showing in a sand at about 6,500 ft.

The well, in 1-4n-17w, is a 900-ft. west stepout from the discovery which was completed through perforations at 5,260-5,418 ft. Two formation tests, one at 6,466-97 ft. and the second at 6,476-97 ft., each yielded about 4,300 ft. of light oil when the drill pipe was pulled. A third test, with hole bottomed at 6,642 ft. and packer set at 6,559 ft. resulted largely in a substantial flow of salt water. At last reports Texaco was preparing to run 7-in. casing to complete the well in the new zone.

At Castaic Junction field where it has completed two producers in a 11,800-ft. Mohnian sand, Humble Oil & Refining Co. was running 7-in. casing to complete its third well in a potential 9,700-ft. pay. The well, in 24-4n-17w and about ½ mile southeast from the discovery made last February, following a drill-stem test at 9,759-90 ft. flowed 20°-gravity crude and water. When pipe was pulled, 7,500 ft. of oil was recovered. The two deeper wells produce crude of about 31° gravity.

Another new-zone discovery was in the old Midway-Sunset field of Kern County. Drilled on a 160-acre lease containing approximately 30 shallow old wells, General Petroleum Corp. completed its 101 Ethel-D in a deeper zone at 2,710-2,870 ft. Drilled to 4,043 ft. and plugged back to 2,870 ft., it was completed flowing and pumping for about 45 bbl. daily, 19° gravity.

At the likewise old Buena Vista Hills field, Kern County, Standard Oil Co. of California made a ½-mile southwest extension. The stepout, 44 "23-B" in SW NW 23-31s-23e, was completed as a 135-bbl. pumper from about 2,800 ft. Socal also gave Lost Hills field a slight extension upon completion of its 151 Cahn as a 130-bbl. flowing well in a 5,300-ft. sand.

In northwest Cuyama, Santa Barbara County, Universal Consolidated Oil Co. gave up fishing efforts at its 55-31 Humble and has plugged back from 5,201 to 2,510 ft. There it will attempt to make a well in the Dibblee section at 1,902-2,508 ft. The

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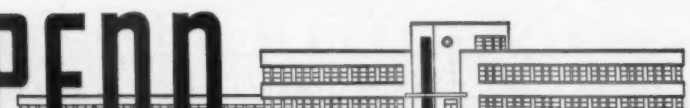

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well is a southeast offset to Hancock Oil Co.'s field opener which was completed as a 240-bbl. pumper at 5,786-6,015 ft. late last August. If the plug-back operation is successful it will give the new area two pay sections.

CALIFORNIA WILDCAT FAILURES

Kern County, Panama area: Western Gulf Oil Co. 77-22 KCL, 22-30s-26e, dry, TD 8,487 ft., elev. 340 ft.

Kings County, Dudley Ridge area: Standard Oil Co. 1 Mackrath, 28-23s-20e, dry, TD 4,596 ft., elev. 223 ft.

Los Angeles County, Soledad Anticline area: Continental Oil Co. 1 Wallace-USL, 33-4n-15w, dry, TD 6,151 ft., elev. 1,825 ft.

Newhall-Placerita area: L. & J. Oil Co. 1 Clarella, 31-4n-15w, dry, TD 609 ft., elev. 964 ft.

Orange County, Richfield area: Anthony J. Keel 1 Keel, 24-3s-9w, dry, TD 3,238 ft., elev. 525 ft.

San Benito County, Panoche Valley area: Tevis F. Morrow 1 Tevis F. Morrow-Carroll, 22-15s-10e, dry, TD 4,299 ft.

Ventura County, Moorpark area: V. A. Porter 1 Smith, 2-2n-19w, dry, TD 849 ft., elev. 904 ft.

CALIFORNIA SUCCESSFUL WILDCATS

Kern County, New light oil zone discovery in Midway-Sunset area: General Pet. Corp. 101 Ethel "D," 36-12n-24w, pumped rate of 50 bbl. oil per day, 18-7° gravity, 22 per cent, perf. 2,710 ft., PB 2,870 ft., TD 4,043 ft., elev. 719 ft.

Extension to Buena Vista Hills. Standard Oil Co. 44 23 B, 23-31s-23e, pumped 136 bbl. oil per day, 23° gravity, 2½-in. tubing 2,726 ft., TD 2,992 ft., elev. 852 ft.

NEVADA WILDCAT FAILURE

White Pine County, Pancake Range area: Continental Oil Co. 1 Meridian 31-16n-56e, dry, Joana lime 3,600 ft., Pilot shale 3,676 ft., Nevada lime 3,970 ft., TD 10,314 ft.

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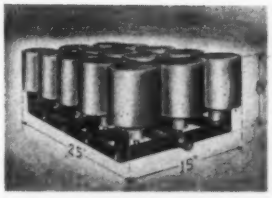

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Texas Gulf Coast

New Major Wilcox Pool In Washington County

HOUSTON.—A new major Wilcox oil pool has been opened with completion of Edwin L. Cox and Jake L. Hamon 1 Bessie T. Hughes, W. R. Munson and E. R. Miller surveys, Washington County. On final test made through perforations at 9,364-69 ft., the well flowed an estimated 200 bbl. of 36°-gravity oil per day through a 7/64-in. choke. Tubing pressure was 1,230 psi. and casing pressure 1,100 psi.

In the Clay Creek area, also in Washington County, Newman Brothers Drilling Co. and Alaska Steamship Co. have completed 3 Ida Rosenbaum as a new oil producer for the area. Through perforations at 5,001-31 ft., 161 shots, the well flowed at the rate of 127 bbl. of 43.8°-gravity oil per day on potential test. Production was through a 9/64-in. choke. Tubing pressure was 800 psi. Location is in the Nester Clay League.

Paul J. Fly and associates are assured of a very good Basal Frio discovery well 5 miles southeast of Fannin in Goliad County. The prospective discovery is 1 Lulu Swickheimer, et al, W. P. Patterson Survey, Abstract 325. Through 32 jet shots at 4,654-62 ft., the well is reported to be flowing into pits at the rate of 75 to 80 bbl. of clean oil per day through ⅛-in. choke. Tubing pressure is 350 psi.

In the South Mayes area of Chambers County, Fidelity Oil & Royalty Co. is coring below 12,032 ft. in 1 A. W. Robbin, D. Richardson Survey 6, Abstract 216.

John E. Dixon is testing 1 W. J. Schorre, prospective Pettus discovery in the Victor Blanco Survey, Abstract 3, 6 miles south-southeast of Runge, in Karnes County. Although no gage is yet available, the well is flowing oil into storage tanks. Drilled to a total depth of 4,210 ft., the hole was cased with 4½-in. production string to 4,200 ft. Pettus sand was topped at 4,021 ft., and operator perforated 4,022-27 ft. and 4,030-35 ft. for production tests.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

DeWitt County: New oil pool, "Duff"—Hawn Bros., et al, 1 Schaefer, James Duff Sur., A-153, 2 mi. E of Holly field, top pay 7,610 (Wilcox) ft., TD 8,000 ft., perf. 7,610-14 ft., IP 161 bbl. oil per day, ⅛-in. choke, TP 1,115 psi., 35° grav.

Wharton County: New pay at Gobbler Creek—M. T. Grubb, et al, 1 Weinheimer, Lyman Conkrite Sur., A-16, top pay 4,227 ft., TD 5,240 ft., perf. 4,227-30 ft., IP 115 bbl. oil per day, 9/64-in. choke, TP 440 psi., 26° grav.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Bee County: Superior Oil Co. 2 Mrs. Celia Maley, J. Pointevent Sur., A-263, 5 mi. SW of Mineral, dry, TD 8,850 ft.

Warren Oil Corp. 2 Heard Ranch, F. Dietrich Sur., A-150, 9½ mi. E of Beeville, dry, TD 4,468 ft.

Brazoria County: Woodley Petroleum Co., et al, 1 Fritz Albrecht, John Edwards Sur., A-190, 3½ mi. SE of Damon, dry, TD 8,540 ft.

Calhoun County: John W. Mecom 9 Minnie S. Welder, Frederick Lundt Sur., 3½ mi. E of Heyser field, dry, TD 8,730 ft.

Chambers County: Falcon Seaboard Drilling Co. 1 Crawford, Smith & Moore, T&NO RR Sur. Section 159, 1½ mi. NE of Stowell, dry, TD 10,490 ft.

DeWitt County: George W. Graham 1 G. Dueser, H. M. Salley Sur., A-417, 3 mi. SW of Holly field, dry, TD 7,731 ft.

Galveston County: Rowan Oil Co. and Texas Gulf Producing Co. 1 Mrs. Corine Scott, C. L'Hommedieu Sur., A-16, 1 mi. N of Acadia, dry, TD 12,473 ft.

Goliad County: Goldston Oil Corp. 1 Geo. A. Ray, D. Southerland Sur., A-268, 6½ mi. SW of Charco, dry, TD 4,980 ft.

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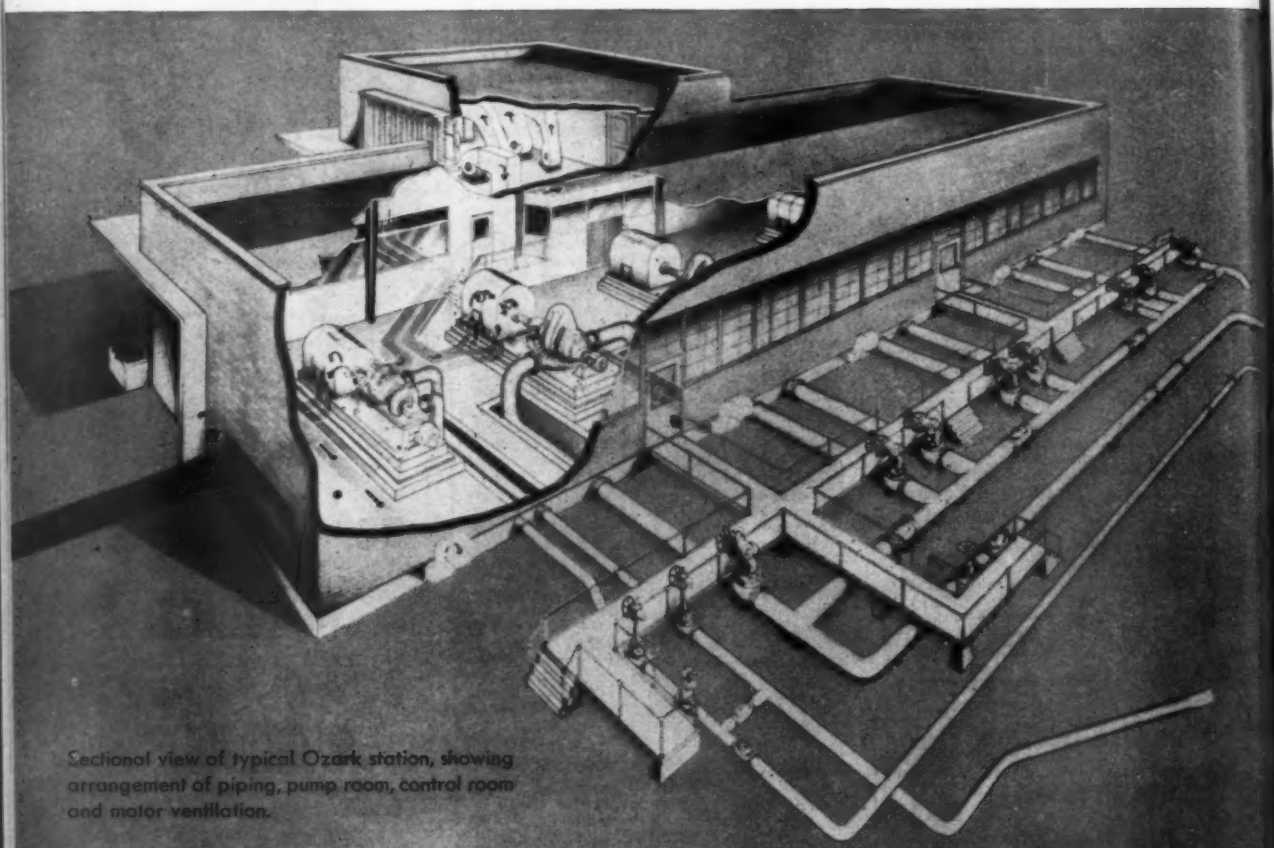

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Danville, Illinois

Harris County: Brazos Oil & Gas Co. 1 Lockett D. Simonton, et al, R. Hall Sur., A-349, 3 mi. S of Hockley, dry, TD 3,052 ft.

Jefferson County: Stanolind Oil & Gas Co. 1 McFaddin Trust, P. Humphries Sur., Spindletop dome area, dry, TD 8,894 ft.

Karnes County: Kirkpatrick & Coates, et al, 1 B. M. Brockman, T. Hinds Sur., A-333, 3 mi. NE of Gillette, dry, TD 5,820 ft.

McCarrick Oil Co. 1 Mary Skloss, M. Leal Grant, A-180, 12 mi. NE of Karnes City, dry, TD 6,005 ft.

Victoria County: Fred W. Shield, et al, 1 C. K. McCan, et al, M. J. Traviesa Sur., 5 mi. SE of McFaddin, dry, TD 6,510 ft.

Rocky Mountain

New Wildcats Started at Widely Spread Points

DENVER.—New wildcats have started at widely spread points throughout the Denver-Julesburg basin of western Nebraska and northeastern Colorado, further increasing the tempo of the current play throughout the area. The California Co. announced location for a deep test on the northwest side of the basin in the South Harrison area, Sioux County, Nebraska, at 1 Mann et al, SW NE NW 27-30n-56w. The well will be a deep test in an area where there has been no drilling in the current play. Superior Oil Co. will drill 17-24-Murray, NW SW SW 24-32n-46w, in the Rushville area, northwestern Sheridan County, as the first of a series of tests on an extensive lease spread throughout the whole basin. In the Eckley area, Yuma County, Colorado, Ohio Oil Co. has started 1 Brophy, SE SE SW 31-4n-46w, the company's first operation in the Colorado portion of the basin. In Cheyenne County, Nebraska, Baxter Drilling Co. has started on a wildcat at 1 Fine, SE SE NE 18-14n-50w, in the West Huntsman area, 3 miles west of the Huntsman oil and gas pool. Southeast of this area Nutting, Brimmer, Utex Oil Co. et al are now rigging up rotary for a wildcat in C NE SW 22-14n-52w, another test of the Cloverly series.

Wildcat results in the basin this week have shown no new discoveries, although Ohio Oil Co. has an apparent gas discovery in the West Sidney area, south of Dorman oil pool and east of a recent gas discovery by Macauley-Dorough, of Denver. The well is 1 State, NW NW SW 16-13n-50w, and gas and some oil were found in the D sand zone. Frontier Refining Co. plugged 1 Siemers, C SW NE 13-15n-51w, in the West Ordnance Depot area, after failing to find production through the Cloverly. McElroy et al found the Muddy sand dry and are now testing a slight show in top of Dakota at 5,586 ft. at 1 Swanson, NW NW SW 21-7n-55w, in the West Willard area, Logan County, Colorado.

Three new oil and gas pools and four gas field extensions in the San Juan basin will be considered by the New Mexico Oil Conservation Commission at public hearing in Santa Fe on December 22. There has been rapid development drilling throughout the gas areas of the central area of the basin during recent months, resulting in these new discoveries and important extension areas. New discoveries cover Mesaverde production in the South LaPlatte area, 30n and 31n, 12w, Pictured Cliffs production at South Kutz Canyon, 27n-11w, and Dakota oil production at Stoney Butte, 21n and 22n, 13w. Important field extensions at Blanco, Fulcher-Kutz, West Kutz Canyon, and LaPlatte, all in San Juan County, will be considered.

New locations.—There were seven new locations in Wyoming four in Colorado, nine in Montana, two in Utah and four in western Nebraska during the week. In Utah, Byrd-Frost, Inc., is now drilling at 1 Sitton, C NE SE 17-33s-25e, an important wild-

cat in San Juan County. Wyoming wildcats included one by Atlantic Refining Co. at 1 Government, SW SE SE 32-38n-90w, in the Southeast Castle Creek area, Natrona County.

Completions. — Twenty-one wells were completed with 14 in Wyoming, 4 in Colorado, and 3 in western Nebraska. Nine of the wells were wildcat failures, with six in Wyoming, two in Colorado and one in western Nebraska. At Spread Creek, Teton County, Wyoming, George G. Travis of Tulsa failed to find production through Frontier and encountered thrust faulting in the well. Continental Oil Co. completed a stepout failure at Sussex at 37 Unit on the northeast side of the field.

WYOMING WILDCAT FAILURES

Rose Dome, Big Horn County: Colorado Petroleum Syndicate 1 Government, NE SE SW 23-55n-95w; 1,600 ft. TD; temporarily suspended. Dinwoody 756 ft., Embar 808 ft., Tensleep 930 ft., Amsden 1,105 ft., Madison 1,400 ft.

Buck Spring Dome, Carbon County: South Bell Springs Syndicate 1 Government, SW SW SW 30-23n-88w; 2,001 ft. TD; temporarily suspended.

Dutton Creek: Newton Oil & Flader 27 Eades, SE SW NW 1-18n-78w; 1,810 ft. TD; temporarily suspended.

Embar Anticline, Hot Springs County: W. A. Robinson 1 Brooks, NE SE SE 18-8n-2e (WRM), 645 ft. TD; suspended. Tensleep 290 ft.

Sussex, Johnson County: Continental Oil Co. 37 Unit, NW SE SW 16-42n-78w; 7,803 ft. TD; completed as a water well. Teapot 3,195 ft., Parkman 3,442 ft., Steele 3,830 ft., Sussex 4,312 ft., Shannon 4,716 ft., Niobrara 5,873 ft., first Wall Creek 6,408 ft., second Wall Creek 6,803 ft., Dakota 7,685 ft., Lakota 7,790 ft.

Spread Creek, Teton County: George G. Travis 2 Unit, NW SE SW 31-44n-112w; 2,855 ft. TD; abandoned. Frontier 1,110 ft., Mowry 2,130 ft.

COLORADO WILDCAT FAILURES

W. Elk Nose, Garfield County: Monument Drilling Co. 1 Government, NE NE SW 29-4s-92w; suspended.

Willard, Logan County: Nix & Harris et al 1 Schaeffer, C NW SW 22-8n-55w; 5,725 ft. TD; abandoned. Niobrara 4,405 ft., Greenhorn 4,940 ft., Muddy 5,212 ft., Dakota 5,298 ft., Cloverly 5,579 ft., Morrison 5,697 ft.

NEBRASKA WILDCAT FAILURE

West Ordnance Depot, Cheyenne County: Frontier Refining Co. 1 Siemers, C SW NE 13-15n-51w; 5,212 ft. TD; abandoned. Niobrara 3,995 ft., Fort Hays 4,278 ft., Codell 4,373 ft., Carlile 4,386 ft., Greenhorn 5,525 ft., Graneros 4,556 ft., D sand 4,802 ft., J sand 4,948 ft., Cloverly 5,149 ft.

Michigan

Dunningville Traverse Gets Second Well

MOUNT PLEASANT. — In Dunningville Traverse oil field, Section 22-3n-14w, Heath Township, Allegan County, P. K. Degenther drilled his first well to follow the discovery and this test was pumping and flowing oil at the rate of 15 bbl. an hour natural. The new well, located at the 1-B U. S. A., SW SE SW 23-3n-14w, is the direct west 10-acre offset to the discovery producer, which this week was reported to be producing an average of 100 bbl. of oil a day. Traverse lime at the 1-B U. S. A. was logged at 1,423 ft., about a foot lower than the Traverse top in the discovery. Oil pay was drilled at 1,433 ft., a foot or more higher in the section than the best pay in the discovery. Well filled and flowed in 7 minutes, flowing 40 bbl. of oil to storage in 1 hour. Well died after this initial flow. Tubing was run and swab flow accounted for an additional 20 bbl., but the 1-B failed to flow steadily. Pumping rods were run and well pumped and flowed 15 bbl. an hour until storage was full. Hole is bottomed at 1,433 ft. Operator will acidize with 350 gal. before final completion. Drilling tools were being moved to the east and south 10-acre offsets and to SE NE SW 22-3n-14w, two 10-acre locations north of the discovery producer.

Hottest Michigan basin area wildcat this week was Turner Petroleum Corp. and Michigan Oil Co. 1 State-Bashore, NE NE

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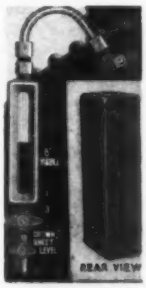

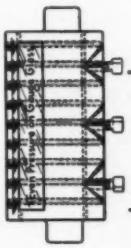

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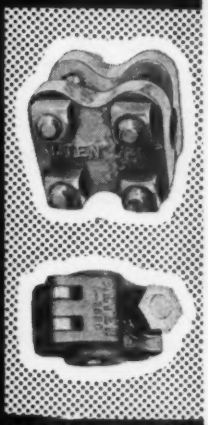

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HAWTHORNE, CALIF.

SW 34-16n-2w, Warren Township, Midland County. Wildcat has been checking in structurally favorable on all geological markers, including the objective Dundee top which was logged at 3,675 ft., some 24 to 40 ft. above this same zone in correlating dry holes. Wildcat will be drilled in about the first of next week after 5-in. casing, set at 3,681 ft., has been cemented and hole has been cleaned out. The Warren wildcat is located about 4 miles northwest of Jerome Dundee oil field, Jerome Township, Midland County.

MICHIGAN WILDCAT FAILURES

Clare County, Grant Township: H. E. Bell & W. B. Street & Scott Drilling Co. 1 Johnson, NE NW SE 26-17n-4w, Dundee 3,754 ft., dry, TD 3,850 ft.

Hayes Township: Lakeland Oil Corp., Ray Andres & J. O. Mutch 1 Skinner & Schaaf, SE SE SW 7-19n-4w, Dundee 4,168 ft., dry, TD 4,233 ft.

Huron County, Sheridan Township: Chapman Oil Co. 1 Shier Heirs, NW SE NW 31-15n-12e, Berea 1,447 ft., dry, TD 1,490 ft.

Mississippi

South Carlton Field Gets Second Completion

JACKSON.—In Clarke County, Alabama, Humble Oil & Refining Co. has completed the second well in South Carlton field. The well, 2 J. H. Wall Estate, located approximately ½ mile south and slightly east of the discovery well, was completed for 80 bbl. of 13.7°-gravity oil per day on pump through perforations at 5,317-22 ft. Electric log has not been released, but from the depth of the perforations, it is thought that this is a sand slightly higher in the lower Tuscaloosa section than the sand from which the discovery well was completed.

In Carthage Point field, Adams County, Mississippi, Southern Production Co. is preparing to set 7,200 ft. of 5½-in. casing in 1 George Armstrong to test for production from the Wilcox. Carthage Point field is producing from the lower Tuscaloosa, although Wilcox shows have been reported in several wells but found unproductive. Recent drilling has revealed the fact that the water level has risen approximately 60 ft. on the southern edge of the field. This steep dip offers a more favorable area for Wilcox accumulation.

George Vasen & Associates 1 Geo. Vasen fee has passed the 19,000-ft. mark and at latest report was coring below 19,075 ft. Detailed geological information has not been released to the general public on this Stone County wildcat.

Magnolia Petroleum Co. has completed 1 Tyer-Swayze, 11-5n-2w, in Kingston field of Adams County, as an excellent Wilcox oil producer. The new oiler is a south offset to the discovery, and is reported to be flowing 11 bbl. of oil per hour through perforations at 6,637-40 ft. Gravity of the oil was 41° and tubing pressure was 400 psi. Completion was made in the bottom sand, although two other sands were logged at 6,479 and 6,577 ft. that were not perforated. This is the third producer for the new field.

In Amite County, Humble has run a drillstem test in 1 W. A. Stockard, et al, wildcat, 33-1n-6e, which is bottomed at 12,500 ft. With packer set at 11,642 ft., using ¼-in. top and bottom chokes, the well flowed by heads 19½ bbl. of oil in 17 hours. The sand tested was from 11,990-12,040 ft. Operators are still testing.

ALABAMA WILDCAT FAILURES

Choctaw County: M. P. Bouslog 1 C. J. Manley, 26-12n-4w, dry, TD 4,018 ft.

Houston County: John S. Neilson 1 A. L. Snell Estate, 10-2n-29e, dry, TD 4,010 ft.

MISSISSIPPI WILDCAT FAILURE

Harrison County: Richard W. Norton, Jr., 1 U. S. A., 26-40s-10w, dry, TD 9,776 ft.

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Oklahoma

Fox-Graham Area Gets Best Springer Producer

THE new Springer sand development in the old Fox-Graham area in Carter County is being boosted with the addition of another good producer, the fourth and best to date. Shell Oil Co. 2 McClain, SW SW NE 22-2s-3w, the new producer, flowed 157 bbl. of oil through open casing in 1½ hours before being shut in to run tubing. Springer sand is open below 3,865 ft., where casing was cemented, to plug-back depth of 4,040 ft. Hole had been drilled to a total depth of 4,450 ft.

The new well is a north offset to the Springer sand discovery well, completed last July by Atlantic Refining Co., and an east offset to Bay Petroleum Corp. 2 Gibbs, second well completed in that pay. The only other well so far is Bay Petroleum Corp. 3 Gibbs, a location north of No. 2.

The Deese sand in the same area also is getting another good well at Bay Petroleum Corp. 2 Carpenter, SW SW SE 15-2s-3w, about ¼ mile north of the Springer sand wells. In a drill-stem test at 4,456-4,504 ft. in that sand, the well flowed at an estimated rate of 100 bbl. per hour. Total depth is 5,103 ft. with 5½-in. casing cemented through the zone to 4,650 ft.

Jones-Shelburne, Inc., has either a new pool or a ¾-mile eastward extension for the South Konawa pool at its 1 Wooten, NW SW SW 2-5n-5e, in Seminole County. In a 56-minute drill-stem test of Senora sand at 1,966-2,005 ft., the well started flowing gas within 5 minutes and oil within 45 minutes. Recovery was 187 ft. of free oil. Flowing pressure during the test was [illegible] psi. Shut-in pressure built up to 600 psi. Casing has been run through the prospective pay zone and will be perforated for completion of the well.

Production of the Southwest Cheyarka pool in the same county is being extended to the north where Deardorf Oil Corp. 1 Lujan, NE NE NW 6-9n-7e, flowed 10 bbl. per hour while testing Gilcrease sand in open hole at 3,712-25 ft.

Falcon Seaboard Drilling Co. is confirming its discovery last August of the Donelly pool in Creek County. Its 2 Kimble, NW SW SW 22-14n-10e, a location south of No. 1, the discovery well, produced 50 bbl. of oil per day in swabbing tests of open hole at 3,257-62 ft. in Misener sand, the discovery well's pay zone. Tubing is being run for completion of the well.

Amerada Petroleum Corp. 1 Federal, C SW SE 3-22n-13w, a rank wildcat at the southeastern tip of Woods County, about 6 miles west of Cleo Springs, Major County, found promising oil and gas showings in Oswego lime, topped at 6,225 ft. A drill-stem test at 6,276-85 ft. in this formation yielded 12 ft. of slightly oil and gas-cut mud in the breakdown. The zone has been passed up for the time being in exploration of deeper horizons. The location is 16 miles northwest of nearest production in the Ringwood field, Major County, principal pay of which is the Manning sand.

OKLAHOMA SUCCESSFUL WILDCATS

Coal County: New pay in E. Oconee—J. A. Roberson 1 Pope, W/2 SW NE 34-1n-9e, elev. 651 ft. DF, flowed 13 bbl. distillate per 1,000,000 cu. ft. of 27,980,000 cu. ft. gas per day from McLish at 7,178-80 ft., TD 7,299 ft., Wapanucka 4,473 ft., Union Valley 5,148 ft., Cromwell 5,183 ft., Pennsylvanian Caney 5,410 ft., Mississippian Caney 5,565 ft., Mayes 5,779 ft., Woodford 5,826 ft., Hunton chert 6,037 ft., Haragan-Hunton 6,122 ft., Chimney Hill 6,239 ft., Sylvan 6,259 ft., Fernvale-Viola 6,371 ft., Trenton-Viola 6,470 ft., bromide 6,620 ft., McLish dense 6,680 ft., first McLish sand 6,942 ft., second McLish sand 7,165 ft.

OKLAHOMA WILDCAT FAILURES

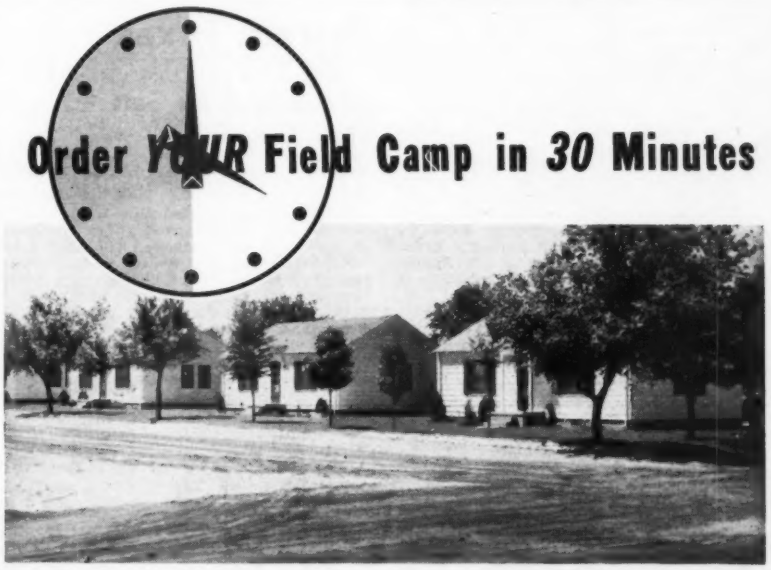
Carter County: Sinclair Oil & Gas 1 Bond, C NW NW 33-5s-2w, elev. 913 ft. DF, TD 12,842 ft. Stockton sand 6,900 ft., Mississippian Caney 8,145 ft., Woodford 8,845 ft., Hunton 9,047 ft., Sylvan 9,457 ft., Viola 9,754 ft., Simpson 10,854 ft., Arbuckle 12,820 ft.

Cleveland County: Ashland 1 Calvert, NW SW SW 14-8n-1w, dry, TD 6,485 ft., Deer Creek 3,015 ft., Tonkawa 4,249 ft., Beele City 4,594 ft., upper Layton 4,979 ft., Hogshooter 5,076 ft., lower Layton 5,168 ft., Checkerboard 5,365 ft., lower conglomerate 5,889 ft., Oswego 6,060 ft., Prue 6,150 ft., Skinner 6,270 ft., Red Fork 6,354 ft.. Woodford 6,456 ft.

Comanche County: Airways and Mid-Continent Petroleum Corp. 1 Walker, SW NE SW 9-2n-10w, elev. 1,193 ft., dry, TD 362 ft.

Ellis County: Sunray, Oklahoma Natural Gas, and Skelly 1 Hanan, C SE NW 1-19n-24w, elev. 2,475 ft., dry, TD 12,057 ft., Wellington shale 2,705 ft., Wellington anhydrite 3,100 ft., base Permian dolomite 3,990 ft., Permian lime 4,122 ft., sand 7,020 ft. and 7,630 ft., Hogshooter 8,055 ft., Layton 8,120 ft., Big lime 8,555 ft., Peru 8,660 ft., sand 10,433 ft. and 10,650 ft., Pennsylvania sand and shale 10,790 ft., broken sand 10,810 ft., shale with sand streaks 10,850 ft., hard sand 10,890 ft., sand 11,285 ft., fossiliferous lime 11,315 ft.

Sinclair Community 1 Berry, C SE NW 14-24n-25w, elev. 2,342 ft., dry, TD 11,255 ft., anhydrite 1,370 ft., Wellington 2,130 ft., Panhandle Big lime 2,360 ft., Chase 3,114 ft., Cottage Grove 3,488 ft., Hoover 4,534 ft., Endicott 5,305 ft., Lovell 5,479 ft., Tonkawa sand 5,495 ft., Tonkawa lime 5,578 ft., Kansas City 6,211 ft., Hogshooter 6,531 ft., Checkerboard 6,657 ft., Big lime 6,800 ft., Oswego 6,845 ft., Cherokee 7,120 ft., Dornick Hills 7,460 ft., Morrow 7,953 ft., Chester 8,062 ft., Mississippi lime 9,056 ft., Woodford



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Jefferson County: Lario Oil & Gas 1 Seay, NW NE SE 34-5s-6w, elev. 888 ft., dry, TD 3,583 ft., sand 2,606 ft.

Kingfisher County: Magnolia 1 Kuntz, C SW SW 27-17n-7w, elev. 1,102 ft., dry, TD 8,869 ft., Tonkawa 5,075 ft., Layton 6,202 ft., Oswego 6,910 ft., basal Pennsylvanian - Chester 7,362 ft., Maramec 7,612 ft., Woodford 8,108 ft., Hunton 8,148 ft., Sylvan 8,446 ft., Viola 8,592 ft., Marshall 8,742 ft., Wilcox 8,862 ft.

Lincoln County: Wilcox Oil 1 Hermann, SE SE NE 22-16n-4e, elev. 903 ft., dry, TD 4,594 ft., Oswego 3,478 ft., Prue 3,617 ft., lime 3,808 ft., Inola 3,926 ft., Bartlesville 3,947 ft., lime 4,036 ft., Mississippi lime 4,124 ft., Woodford 4,335 ft., Hunton 4,370 ft., Viola 4,467 ft., Wilcox 4,572 ft.

Logan County: Westgate - Greenland and Mason Oil 1 McPeek, NW NW SE 18-18n-3w, elev. 1,005 ft., dry, TD 4,857 ft., Carmichael 3,260 ft., Oread 3,510 ft., Tonkawa lime 2,680 ft., Tonkawa sand 3,730 ft., Lovell 3,870 ft., Avant 4,090 ft., Dewey 4,190 ft., Layton 4,850 ft.

E. N. Jordan 1 Johnston, CW/2 NW SE 33-16n-1w. elev. 1,211 ft., dry, TD 5,839 ft., Big lime-Oswego 5,100 ft., Bartlesville 5,347 ft., Mississippi lime 5,433 ft., Woodford 5,500 ft., Hunton 5,565 ft., Sylvan 5,580 ft., Viola 5,686 ft., dense (?) 5,763 ft.

Okfuskee County: J. A. Chapman 1 Harjo, SE SW SW 5-12n-7e, elev. 926 ft., dry, TD 4,542 ft., Hogshooter 1,545 ft., Layton 1,638 ft., Checkerboard 1,955 ft., conglomerate 2,038 ft., Oswego 2,878 ft., Prue 2,899 ft., Skinner 3,078 ft., Earlsboro 3,338 ft., Hunton 4,226 ft., Sylvan 4,308 ft., Viola 4,396 ft., first Wilcox 4,455 ft., second Wilcox 4,489 ft.

Pawnee County: Davidor & Davidor 1 Hurst, NE NE NW 14-22n-5e, elev. 875 ft., dry, TD 3,414 ft., Checkerboard 2,456 ft., conglomerate 2,500 ft., Big lime 2,623 ft., Mississippi lime 3,124 ft., Woodford 3,360 ft., Misener 3,380 ft., Wilcox 3,384 ft.

Payne County: T. N. Berry & Co. 1 Bennett, NW SW NE 31-19n-4e, dry, TD 4,143 ft.

Pontotoc County: British-American 1 Gear, SE SW SE 22-4n-4e, dry, TD 1,478 ft., Wewoka sand 1,047 ft., Viola 1,303 ft., bromide dense 1,405 ft., bromide sand 1,475 ft.

Seminole County: Kingery - Patterson 1 Glasson, SW NW NE 12-9n-7e, dry, TD 3,622 ft.

Stephens County: Carl Carter 1 Burkhart, NW SW SW 34-1n-6w, elev. 1,156 ft., dry, TD 6,169 ft., Hoxbar 3,647 ft., oolitic lime 4,675 ft. and 4,924 ft., Deese 4,940 ft.

Tillman County: C. E. McCaughey 1 Thompson, SE SE SE 28-2s-15w, elev. 1,087 ft., dry, TD 3,150 ft., base Cisco-top Canyon 2,643 ft., base Canyon-top Strawn 3,135 ft.

Eastern Texas

Sandusky Area Gets New Discovery

DALLAS.—A new discovery, or extension to Sandusky field of Grayson County, was completed this week at Ada Oil Co. 1 S. T. Barnes, 2 miles southwest of the town of Sandusky. The well rated 193.2 bbl. of 40°-gravity oil daily, flowing through 9/64-in. tubing choke, from perforations in the Oil Creek sand at 7,160-82 ft. Gas-oil ratio was 938 cu. ft. Top of the Oil Creek was 7,148 ft., and top of the Ellenburger was 7,390 ft. It was drilled to 7,806 ft. and drill-stem tests to 7,750 ft. recovered some oil, but operators plugged back for completion. Location is over 1 mile southeast of the first Oil Creek sand discovery.

Pure Oil Co. staked location for a 7,800-ft. test in the area, which was calculated to reach the Ellenburger. Their venture is the 1 O. B. Rich, R. H. Armstrong Survey, north of the town of Sandusky, and about 1½ miles northwest of the first strike.

New exploration work in East Texas included locations for three wildcats in Cherokee County. In northeast Cherokee, American Petroleum Co. 1 E. A. Childress, Wesley Dykes Survey, was to be a 4,500-ft. Woodbine test. Union Producing Co. made location for its 1 W. W. Dover in the John Blanton Survey, south of North Jacksonville Woodbine field. Contract depth was 5,000 ft. In the Maydell area, National Associated Petroleum Co., Tulsa, 1 Mary E. Mullinax was to be drilled to 9,000 ft., on a 191-acre tract in the Evan Bolton Survey.

EAST TEXAS (DISTRICTS 5, 6 AND 6-P) SUCCESSFUL WILDCAT

Anderson County: Texas Co. 1 M. T. Holmes, Francis Betick Sur., A-105, 2½ mi. NE Tennessee Colony, TD 10,090 ft., elev. 395 ft., perf. Pettit 9,611-20 ft., 9,631-42 ft., flowed 234.75 bbl. of 53°-

LEGAL

3,978.36 acres of Tribal and 729.17 acres of allotted Indian Lands located in Twp. 12 N Range 22 & 23 E.; Twp. 13 N Ranges 21, 22, & 23 E.; Twp. 14 N Range E. and Twp. 16 N Range 31 E., BHM, in the Cheyenne River Reservation, South Dakota, are being advertised for oil and gas leasing, bids on which will be opened December 5, 1950, at 2:00 P.M., C.S.T. at the office of the Superintendent of the Cheyenne River Indian Agency, Cheyenne Agency, South Dakota. Full descriptions and copies of the advertisement may be obtained from the Superintendent, Cheyenne River Indian Agency, South Dakota, or from the Oil and Gas Supervisor, U. S. Geological Survey, Federal Building, Casper, Wyoming.

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gravity oil a day, ¼-in. choke, GOR 1,670 cu. ft., TP 2,900 psi.

EAST TEXAS (DISTRICTS 5, 6 AND 6-P) WILDCAT FAILURES

Bosque County: Emory A. Dunman 1 F. T. Shaffer, T. R. Hawkins ½ Lge., 6½ mi. SW Iredell, dry, TD 1,551 ft. in sand, elev. 1,134 ft.

Denton County: Harry Kithas 1 James Jackson, Hannah Estes Sur., A-389, 4 mi. W Pilot Point, dry, TD 1,530 ft.

Southwest Texas

Good Gas-Condensate Well in Nueces

CORPUS CHRISTI.—The Eastern States Petroleum Co. 1 Adolph Till, gas-condensate discovery well approximately 2 miles east of Stratton field, Neuces County, has been gaged for 14,000,000 cu. ft. of gas per day plus 20 bbl. of 58.1°-gravity condensate per million cubic feet of gas. Production is through perforations at 7,241-50 ft. Shut-in pressure was 2,574 psi. Through a ¼-in. choke, the discovery flowed 3,333,000 cu. ft. of gas per day with pressure on the tubing 2,157 psi. Location is in the F. Z. Bishop Subdivision in the Palo Alto Grant.

Ben D. Marks, Tr., is coring ahead after running a drill-stem test in 1 Viggo Gruy et al, wildcat approximately 4 miles east-northeast of Hellen field, Jim Hogg County. A 7-minute drill-stem test was run through perforations at 3,638-43 ft., ¼-in. chokes. The well blew fluid out of the hole and made dry gas with the bottom-hole flowing pressure 1,215 psi. Operator started coring ahead, and cored sand with odor and oil cut from 3,648-51 ft., and water from 3,651-55 ft. This prospective discovery is located in the Simon de Ynojosa Survey A-356.

Charlotte field of Atascosa County has another productive zone with completion of Humble Oil & Refining Co. 2 Emilia Lejan, which was completed in the Austin chalk. The well was originally completed in July 1947 through perforations at 7,003-006 ft. in the Edwards lime. In reworking the well, Humble backed up the hole to 6,950 ft. and perforated the Austin chalk at 6,435-75 ft. On potential test, the well flowed 226 bbl. of 38°-gravity crude per day through 3/16-in. choke. Tubing pressure was 782 psi. The new pay opener is located in the John Noble Survey 1,438.

In Triple A field, San Patricio County, J. S. & R. H. Abercrombie and Atlantic Refining Co. have abandoned 1 Minnie C. Gregory, southwest outpost to the field, at total depth of 9,062 ft. This was the sixth test drilled in the field, the other five being producers.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) SUCCESSFUL WILDCAT

Nueces County: Gas-condensate discovery—Eastern States Petroleum Co. 1 Adolph Till, et ux, Sec. 161, F. Z. Bishop Subd., Palo Alto Grant, 5 mi. NW of Bishop, top pay 7,241 ft., TD 7,815 ft., perf. 7,241-50 ft., IP: 14,000,000 cu. ft. of gas per day on open flow, plus 20 bbl. condensate per M.M.c.f., TP 2,574 psi. 58.1° grav.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Aransas County: George W. Graham 1 Geo. Easley, et al, Lot 1, Block 47, fifth addition to Taft Farm lands, 2 mi. SW of Bayside, dry, TD 9,260 ft.

Duval County: Morris Cannan 1 Tewell Co. fee, S. B. Childress Sur. 176, A-1,707, 18 mi. NW of Freer, dry, TD 2,200 ft.

Gonzales County: Riddle Oil Co. 1 E. L. Henley, Gonzales County School Land Sur., A-230, 7 mi. SW of Gonzales, dry, TD 1,654 ft.

Jim Hogg County: V. G. Schimmel, et al, A-1 Julian Vela Pena, Block 69, Sur. 574, Share 2, El Peyote Grant, 15 mi. SW of Hebbronville, dry, TD 1,850 ft.

Jim Wells County: Great Lakes Carbon Corp. and H. H. Howell 1 Alice Dunn, Lot 61, J. B. Dibrell Subd. of Wade Ranch, LaBlanca Grant, 3 mi. NW of Gallagher field, dry, TD 5,257 ft.

San Patricio County: J. S. & R. H. Abercrombie and Atlantic Refining Co. 1 Minnie C. Gregory, Robert Saddler Sur. A-233, 2½ mi. NW of Taft, dry, TD 9,062 ft.

Starr County: W. H. Holland 1 John Brannan, Porcion 96, 10 mi. E of Rio Grande City, dry, TD 3,557 ft.

Travis County: S. Kopel and S. Ginsburg 1 Harry Mayne, B. L. Y. Mirales and I. A. Paschal surveys, 3 mi. E of Elroy, dry, TD 651 ft.

Zapata County: Charles E. Long 1 Mrs. N. Smith, et al, Block 1, Harvey Subd., El Javali Grant, 13 mi. W of Guerra, dry, TD 1,611 ft.

Don H. Marsh, et al, 2 Eleuterio Lopez, S. C. Hendricks Sur. 288, Cert. 1,383, 36 mi. SW of Hebbronville, dry, TD 2,418 ft.

Canadian Fields

Western Canada Receives Another Cretaceous Strike

CALGARY.—The Ellerslie Lower Cretaceous oil discovery, located a few miles south of Edmonton, has been placed on production, flowing at the rate of 264 bbl. daily after perforating casing. The well, P. R. C.-Ellerslie 1, in LSD 10, 31-51-24w4, is about 3¼ miles northeast of Whitemud Lower Cretaceous oil pool. The well was drilled by Redwater Leaseholds, Chevron Petro-

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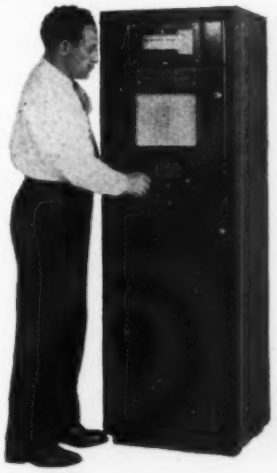

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Model 26-102

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SPECIFICATIONS

Sensitivity The Titrilog quantitatively records oxidizable sulfur compounds in concentrations as low as one part in ten million or 0.005 grains per 100 cubic feet.

Power Requirements The Titrilog operates on standard 60-cycle 115-volt power. It requires approximately 6 amperes.

Cabinet Dimensions The Model 26-102 Titrilog is housed in a floor-mounted cabinet 66-inches high, 22½-inches wide, and 18½-inches deep. The strip-chart recording milliammeter is mounted at eye level, and directly below it is the control panel.

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leums, and Pacific Petroleums group. The well indicated oil discovery in the Cretaceous several weeks ago, when oil flowed to surface in 11 minutes during drill-stem test of interval 3,907-36 ft. The hole was carried down to 5,350 ft., in an unsuccessful effort to find Devonian production. Hole was then plugged back to 3,930 ft., and perforated opposite the pay.

National Petroleum Corp. found natural gas plus salt water during drill-stem test of the Viking sand at its initial Acheson area venture. In reporting the test results company officials also stated that the well was logging somewhat lower than anticipated at top of the Viking. The well, National-Acheson 1, is located in LSD 3, 28-52-26w4, about ⅞ mile southwest of Central Leduc-Wild 1, D3 oil well. Viking sand drill-stem test at bottom 3,482 ft. gave gas at the rate of 412,000 cu. ft. daily, and a fluid recovery of 220 ft. of salt water. Drilling is now proceeding at 3,550 ft., heading for the Lower Cretaceous and Devonian objectives.

The Seaboard group is moving into the Muskeg area of north central Alberta for its first drilling operations in that region this winter. That group, which includes Seaboard Oil Co. of Delaware, Honolulu Oil Corp., and Barnsdall Oil Co., has extensive Crown Reservation holdings in that region, about 50 miles northeast of Lesser Slave Lake. The new wildcat is Seaboard-Desmarias 1, in LSD 4, 34-8-25w4, about 162 miles north of Edmonton and 2 miles northwest of the tip of South Wabiskaw Lake.

Pacific Petroleums, Ltd., and Peace River Natural Gas Co., Ltd., are moving in drilling equipment for an exploratory test in northeast British Columbia, about 30 miles west of the Alberta border. Prime objective is natural gas, which is hoped to be encountered around the 2,800-ft. level. The well, Pacific-Sunrise 1, in LSD 4, 29-79-17w6, is about 18 miles southwest of P.R.N.G. 5 gas well, and 16 miles northwest of Dawson Creek.

Albercan Oil Corp. and an Alberta syndicate have started a wildcat in the Acheson-Stony Plain area, about 12 miles west of Edmonton. The new venture is Albercan-Spruce Grove 1, in LSD 16, 25-52-27w4, located about 3¼ miles west of Central Leduc-Wild 1, D3 oil well, and the same distance northwest of Imperial-Stony Plain 1, oil success. California Standard-Imperial Devonian oil wells are located about 4½ miles northeast of the new wildcat. Spruce Grove 1 was spudded this week, and crew is currently winterizing the rig prior to continuing drilling.

CANADIAN SUCCESSFUL WILDCAT

C.P.R.L.-Ellerslie 1, LSD 10, 31-51-24w4, TD 5,330 ft., PB 3,930 ft., 264 bbl. oil per day.

CANADIAN WILDCAT FAILURES

Oxford-Sarepta 1, LSD 14, 22-49-23w4, TD 5,660 ft.

Shell-Watt Mountain 1, LSD 6, 23-111-22w5, TD 6,391 ft.

Placid-South Wetaskiwin 1, LSD 2, 30-45-23w4, TD 6,150 ft.

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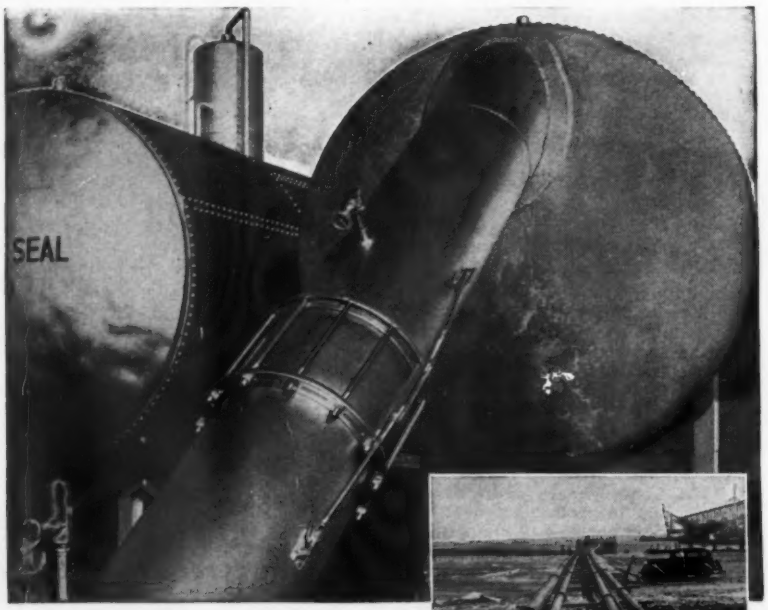

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Louisiana-Arkansas

New Area Opened In Miller County

SHREVEPORT.—In Miller County, Arkansas, Stanolind Oil & Gas Co.'s A-1 Miller Land & Lumber Co., 20-18s-27w, flowed 200 bbl. of 38.2°-gravity oil per day. Production was from perforations in the Rodessa at 6,303-12 ft. Gas-oil ratio was 1,300 : 1, and working pressure at the surface was 275 psi. Located some 6 miles northeast of Bright Star, the wildcat was originally planned as a 7,000-ft. test to the Travis Peak, but was bottomed at 6,515 ft. The following tops were reported: Tokio 3,255 ft., Tuscaloosa 3,570 ft., Comanche 3,760 ft., massive anhydrite 5,665 ft., Rodessa 6,010 ft., second Rodessa 6,055 ft.

In North Louisiana, Sinclair Oil & Gas Co. brought in a new discovery at its 1 R. B. Sharp in 10-4n-9e, Concordia Parish. The well flowed 267 bbl. of oil per day from Wilcox sands perforated at 6,697-6,706 ft. Tubing pressure was 675 psi., and casing pressure 800 psi. on a 12/64-in. choke. On 3½-hour flow test the well recovered 14½ bbl. of fluid, 30 per cent oil and 70 per cent wash water, tubing pressure 400 psi., casing pressure 700 psi., the first hour. The second hour 22 bbl. were recovered, being 75 per cent oil and 25 per cent wash water, tubing pressure was 574 psi., casing pressure 700 psi. The third hour recovery was 15½ bbl., 84 per cent oil and 16 per cent wash water, with the same tubing and casing pressures as during the second hour of the test. The last ½ hour recorded 10 bbl., only 4 per cent water, tubing pressure was 625 psi., casing pressure 775 psi.

In Tensas Parish, D. M. Lide's 1 Jacoby, discovery in 1-12n-12e, was waiting on storage tanks before testing Tuscaloosa prospects. The formation was perforated at 8,810-20 ft., with 7-in. pay string set at 8,820 ft.

Carter Oil Co. continues drilling at wildcats in Union and La Salle parishes. The Union test is 1 Willie Mae Stancil, 11-20n-1e, now below 5,235 ft. The La Salle operation is 1 Delta Tensas, 6-5n-4e, drilling ahead at 3,960 ft.

The accelerated rate of activity in Bull Bayou field continues at a high pace. In the Red River Parish portion of the field, Nabors and Albritton completed the 1 Jenkins for 360 bbl. per day. Location is in Section 15-12n-11w. Production was from the Paluxy at 2,714-22 ft. Gravity is 42.6°, and no gas flowed from the well. In the De Soto Parish section, O. C. Coles, Jr.,

completed his Williams estate for 240 bbl. of 42.9°-gravity oil per day. The well flowed from the Paluxy at 2,749-56 ft. Location is in Section 10-12n-11w. Recently Sam Sklar brought in three good producers, and several new wells have started in the field.

NORTH LOUISIANA WILDCAT FAILURES

Bienville Parish: Central Drilling Co. 1 Long Bell, 2-15n-10w, dry, TD 2,875 ft.

Concordia Parish: Marine Oil Co. 1 S. L. Winston, 26-6n-9e, dry, TD 6,512 ft., elev. 61 ft., Vicksburg 1,595 ft., Cockfield 2,118 ft., Cook Mountain 2,678 ft., Sparta 2,910 ft., Cane River 3,685 ft., Wilcox 4,145 ft.

Placid Oil and Gulf Refining 1 J. B. York, 11-1n-8e, dry, TD 8,525 ft.

ILLINOIS WILDCAT FAILURES

Bond County: Brinkley & Kelly 1 Mosner, NW SW NE 17-5n-2w, dry, TD 1,250 ft.

Clinton County: J. O. McCue 1 Simonton-Gailate, SW NE SE 27-1n-3w, dry, TD 1,520 ft.

C. K. Stein 1 Allen, NE NE SE 9-2n-2w, dry, TD 1,250 ft.

Crawford County: Skiles Oil Corp. 1 Walker, SE SE NW 26-6n-12w, dry, TD 1,617 ft.

Edgar County: W. W. Hinnegman 1 Jump, NE SW NW 22-14n-13w, dry, TD 528 ft.

Effingham County: Smith Oil Association 1 Clow, SE NW SW 31-8n-4e, dry, TD 1,970 ft.

Franklin County: W. Duncan 1-B U. S. Coal & Coke, SE NE NE 16-6s-3e, dry, TD 3,038 ft.

Hamilton County: Oil Management 1 Moore, SW SW NE 3-6s-5e, dry, TD 3,463 ft.

Superior Oil Co. 1 Leslie, SE NE SE 22-5s-5e, dry, TD 3,478 ft.

Lawrence County: Hayes Drilling Co. 1 Milhouse, NW NE SW 24-3n-13w, dry, TD 2,248 ft.

Olds Oil Co. 1 Simon, SE SE NW 34-4n-10w, dry, TD 1,789 ft.

Marion County: A. J. Slagter, Jr., 1 Gordon, NE SE SW 32-2n-4e, dry, TD 2,840 ft.

Saline County: I. B. Green 1 Burnett, NE NE SW 11-8s-6e, dry, TD 400 ft.

Wayne County: F. A. Noah & Sons 1 Meyer et al., NE SW NE 12-2s-5e, dry, TD 3,263 ft.

Miami Operators 1 Hornback, NE NE NE 35-2n-9e, dry, TD 3,353 ft.

INDIANA SUCCESSFUL WILDCAT

Vanderburgh County: Skiles Oil Corp. 1 Shrode, NW SW SW 18-6s-11w, IP 63

Illinois-Ind.-Ky.

New Pools Discovered In Two Indiana Areas

ANOTHER new pool for the Bukfin area, 4 miles northeast of Mt. Vernon, southern Posey County, Indiana, is in the making where Ryan Oil Co. is testing the Aux Vases zone in its 1 Buchanan, NE NE NW 22-6s-13w. In one 24-hour test before shooting the pay, the well swabbed 61 bbl. of oil. Operators expect to shoot the pay with a view toward improving production. Saturation was logged at 2,766-72 ft. Hole was drilled to 2,930 ft. A previous drill-stem test of the zone showed considerable gas and yielded 325 ft. of oil and 150 ft. of oil-cut mud on the breakdown. The location is a mile south of the Oliver South pool, opened earlier this year, and about the same distance northwest of the Welborn pool.

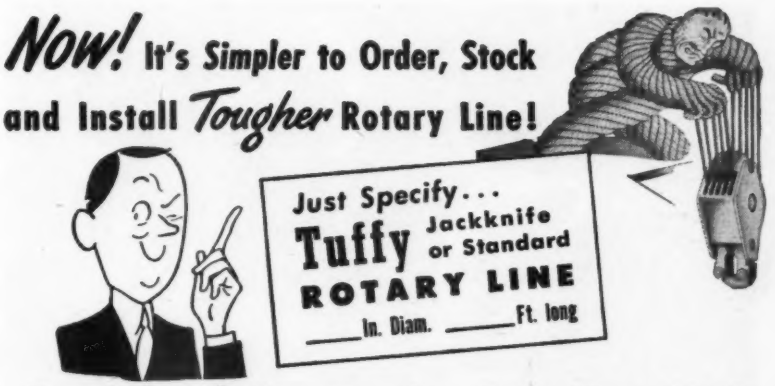
Barron Kidd 1 Martin, NW SW NW 5-5s-11w, a wildcat in the St. Wendell area, 9 miles northwest of Evansville, Vanderburgh County, Indiana, is cleaning out to test promising oil showings encountered in Cypress sand at 2,224-38 ft. In a 60-minute drill-stem test of this zone prior to running casing, they got 780 ft. of clean oil with 170 ft. of water. It is about a mile from any other production.

Discovery of a second pay zone, the Rosiclare lime, for the recently opened Monroe City North pool, Knox County, Indiana, appears to have been made by Graham Development Corp. in its 3 Meyers, in Militia Donation 38-2n-9w. Previous wells in the area have produced from the Aux Vases zone. With plug drilled out to test that pay, oil rose 1,625 ft. in 72 hours while cleaning out was delayed by bad weather. Rosiclare saturation is at 1,665-68 ft. The Aux Vases zone is around 1,500 ft.

Aurora Gasoline Co. and N. V. Duncan have uncovered a third potential pay zone, the Aux Vases, for the new Ellery West area, 2 miles south of Golden Gate, Wayne County, Illinois. Their 1 Fisher Community, NE NW NE 27-2s-9e, found good saturation both in the Aux Vases, previously unproductive in the area, and the Rosiclare. Saturation in the former was logged at 3,223-41 ft. and in the latter at 3,322-30 ft. Approximately 1,950 ft. of clean oil was recovered in a 60-minute drill-stem test of the former zone. In a similar test of the lower zone, the well flowed clean oil after getting a good showing of gas. In addition to the Rosiclare, the O'Hara lime has been productive in the area. Since the tests reported, the Fisher well has been drilled to the McClosky lime.

ILLINOIS SUCCESSFUL WILDCAT

Wayne County: Dale Hopkins 1 Redd, SW NE SW 6-2s-7e, IP 8 bbl., McClosky 3,328-31 ft. and 3,334-43 ft., TD 3,343 ft. (near Clay City-Noble Consolidated pool).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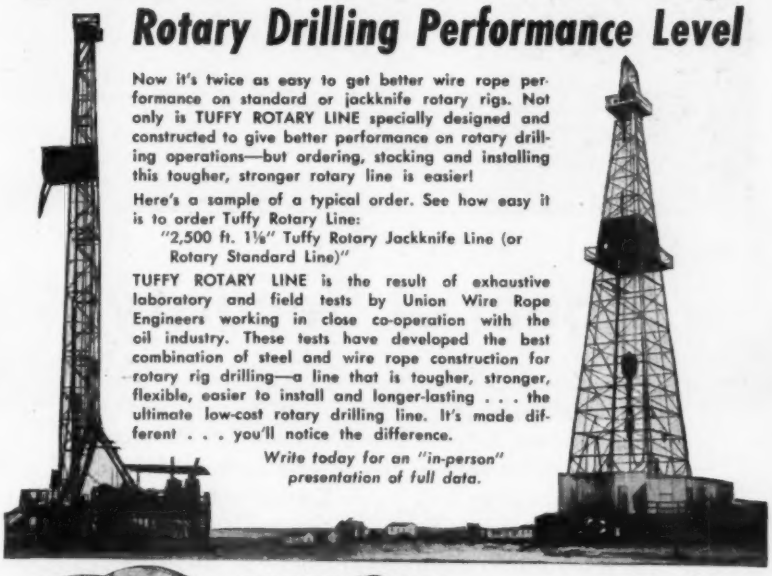

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"2,500 ft. 1⅛" Tuffy Rotary Jackknife Line (or Rotary Standard Line)"

TUFFY ROTARY LINE is the result of exhaustive laboratory and field tests by Union Wire Rope Engineers working in close co-operation with the oil industry. These tests have developed the best combination of steel and wire rope construction for rotary rig drilling—a line that is tougher, stronger, flexible, easier to install and longer-lasting . . . the ultimate low-cost rotary drilling line. It's made different . . . you'll notice the difference.

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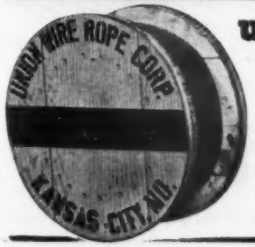

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bbl., Cypress 2,358-67 ft., TD 2,367 ft. (opens new pool).

INDIANA WILDCAT FAILURES

Daviess County: W. C. Heppard 1 Morris, NE NW SW 34-2n-6w, dry, TD 2,265 ft.

Dubois County: Lobree & Jobe 1 Smith, NE NE NW 8-3s-5w, dry, TD 987 ft.

Gibson County: Heath-Dudley 1 Horrall-Cain, SW NE NW 12-1s-11w, dry, TD 2,182 ft.

Ryan & Sharp 1 Joe Tennis, NE NW SE 7-2s-12w, dry, TD 2,652 ft.

Calvert Drilling Co. 1 George Smith Heirs, NW NW SE 26-3s-13w, dry, TD 2,484 ft.

Posey County: Frank B. Murta 1 Allyn, NW SE NW 35-7s-5w, dry, TD 2,912 ft.

Spencer County: Joe Reznik 1 Talbot-Braun, NW SE NW 4-6s-4w, dry, TD 1,472 ft.

Warrick County: National Associated Petroleum Co. 1 Kampe, SE NE NE 20-4s-9w, dry, TD 2,100 ft.

WESTERN KENTUCKY WILDCAT FAILURE

Henderson County: Barron Kidd and A. W. Cherry 1 Smith, 24-R-26, dry, TD 2,244 ft.

EASTERN KENTUCKY

ASHLAND. — Eastern Kentucky's worst snow and wind storm in many years which hit this area last week end has crippled drilling activity. From 10 to 15 in. of snow which in many places drifted to many times that height has made all secondary roads impassable and made movement of rigs to and from locations practically an impossibility.

No new locations or completions were recorded for the week.

Signal of Security

Though tiny in terms of illuminating power, the glimmer of a Christmas Candle is in many ways the most piercing light in the world. For to those who would alter the meaning of American freedom, this glowing flame stands as a symbol of renewed faith in our Creator and in our inalienable rights to life, liberty and the pursuit of happiness.

Again this year it is our sincerest wish that the warming glow of the Christmas Spirit will burn bright for you and yours. And we join with you in joy and thankfulness for our many blessings in this great land of ours.

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JOSEPH T. RYERSON & SON, INC. Steel-service plants at: New York, Boston, Philadelphia, Detroit, Cincinnati, Cleveland, Pittsburgh, Buffalo, Chicago, Milwaukee, St. Louis, Los Angeles and San Francisco.

Ohio Fields

Heavy Snowfall Puts Stop On All Drilling

COLUMBUS. — The heavy snowfall over the whole state completely stopped all drilling operations for several days, and now a week later, the southern area is still not yet dug out. Report was made on only one completion.

Daubenspeck et al 2 C. W. Colgin, Lot 7, Howard Township, Knox County, found the Clinton at 2,549-72 ft. and 2,587-94 ft. with 300,000 cu. ft. of gas natural. The gas was shut in the casing and the sand was not shot.

For the week ended November 24, 22 locations from 8 counties were reported, 9 from Meigs, 5 from Ashland, and 4 from Licking. Ashland led in completions with 7 out of a total of 20.

John Morrow et al have stepped out 1¼ miles with a location on E. O. Rodehaver, in the second greater of New Castle Township, Coshocton County. E. C. McManaway et al has moved in for a wildcat on the Elmer Wolf tract in Section 22, Blooming Grove Township, Richland County.

C. H. Wheeler Merges With Ohio Companies

One of the major industrial mergers of recent months, just announced, involves three manufacturers of power-plant equipment. These are C. H. Wheeler Manufacturing Co., of Philadelphia; Economy Pumps, Inc., and Klipfel Valves, Inc., both of Hamilton, Ohio.

Announcement of the merger was made by L. G. L. Thomas, president of the three companies. The merger brings together three companies long known to the power field. C. H. Wheeler of Philadelphia has been designing and building steam-condensing, vacuum-producing, and water-cooling equipment for about 50 years.

Economy Pumps, Inc., is a manufacturer of centrifugal pumps in capacities up to 200,000 g.p.m.

Klipfel Valves, Inc., founded in 1904, manufactures automatic regulating valves.

Eggelhof Engineering Expand New Orleans Office

Al Deckert has joined the Eggelhof Engineering organization in the New Orleans office and will serve as sales engineer in the Louisiana, Mississippi, and Alabama area covered by this organization east of New Orleans. Henry Turner, district manager, will devote his time to the Louisiana territory west of and including New Orleans.

Eggelhof Engineers are manufacturers' representatives for power-plant equipment, industrial apparatus and controls, and steam specialties with eight offices covering Texas, Oklahoma, Arkansas, Louisiana, Southern Mississippi, and Alabama.

HENRY H. PARIS DISTRIBUTOR Inc.

Manufacturer's Agent - Oil Well and Refinery Supplies

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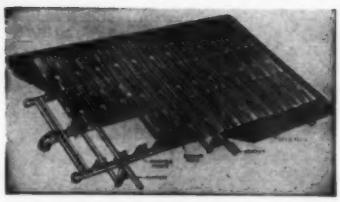

VOLCANO SUPERIOR GAS BURNERS

These burners derive their higher efficiency and longer life from such features as: All-steel construction; Burner heads with double barrel shank and double mixer are equivalent to two ordinary burner heads; Slight H-shape of head assures more perfect combustion by proper circulation of secondary air; series of heads on triple manifold covers approximately entire firebox area. For superior efficiency, specify Volcano Superior Gas Burners.

Agent and Distributor for the following Nationally known Manufacturers

W. C. NORRIS MANUFACTURER, INC.
Tulsa, Oklahoma
Quality Pumping Equipment, Swage Nipples, Bull Plugs, Welding Fittings, etc.

WHEELING MACHINE PRODUCTS CO.
Wheeling, West Virginia
XL Steel Pipe Couplings for OIL COUNTRY TUBULAR PRODUCTS.

THE OHIO INJECTOR COMPANY
Wadsworth, Ohio
OIC VALVES, Bronze, Iron, Cast and Forged Steel for all purposes.

HARRISBURG STEEL CORPORATION
Harrisburg, Pennsylvania
Forged Steel Flanges and Seamless Casing Couplings.

VOLCANO BURNER COMPANY
Houston, Texas
Volcano Superior and Gulf States All Steel Gas Burners for OIL COUNTRY BOILERS.

OIL STATES EQUIPMENT COMPANY
Houston, Texas
OSECO Silvertop Fusible Plugs with renewable inserts for all types OIL COUNTRY BOILERS.

DRESSER MANUFACTURING DIV.
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WESTERN SAFETY BARREL STAND STEEL FORGINGS, Inc.
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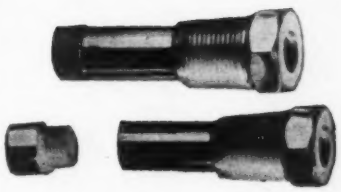
Weld Saddles.



OSECO High Pressure Fusible Plugs

Unique design permits replacement of inserts instead of the entire plug. OSECO "Silver Top" plugs are made in all standard sizes of best quality bronze, under A.S.M.E. specifications, for 300 and 350 lb. oil field boilers. They can also be furnished in Monel or Stainless Steel.

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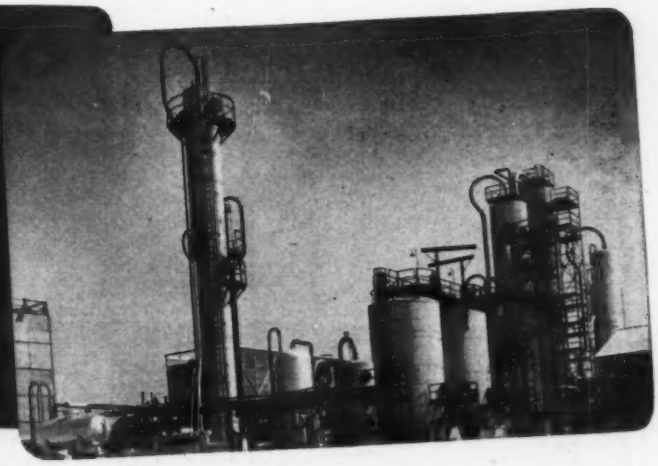

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Sole Distributor of Nelson Chemical Proportioning Pumps

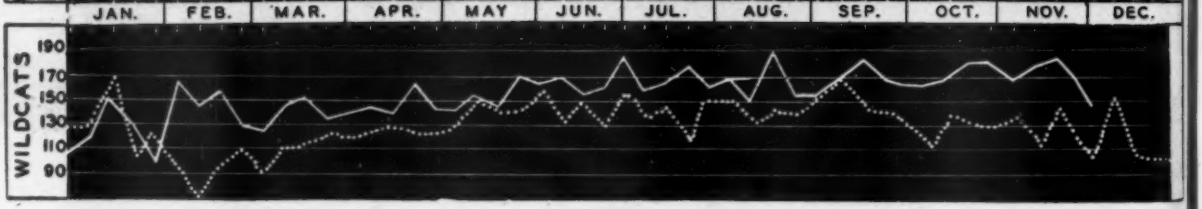
CURRENT STATISTICS

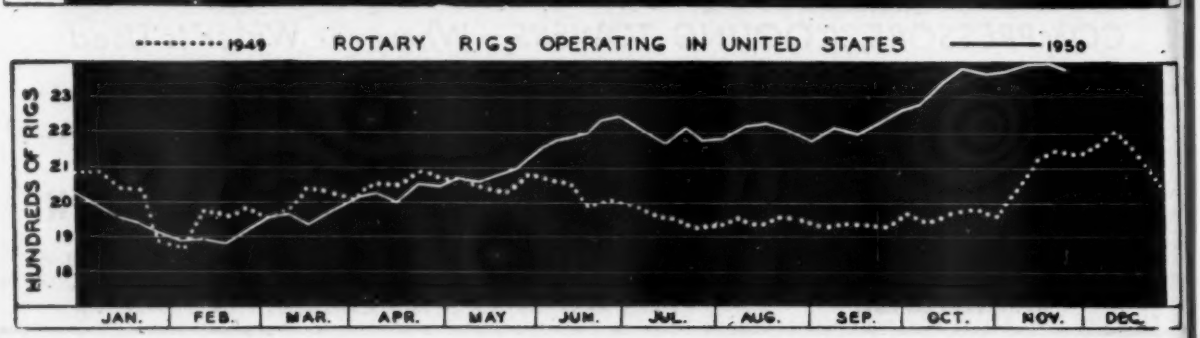
EXPLORATION

WEEKLY WELL COMPLETIONS . . . . . WEEK ENDED DECEMBER 2, 1950

	Total of all wells					Dec. 2		Wildcat completions and discoveries					Cumulative total, 1950				
	Comp.	Oil	Gas	Dry	Footage	1950	1949	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	4	2	0	*2	5,784	627	873	0	0	0	0	0	0	0	0	0	0
Pennsylvania	9	4	1	†4	14,802	1,241	1,454	0	0	0	0	0	0	0	1	3	4
West Virginia	5	0	5	0	13,811	602	481	0	0	0	0	0	0	0	21	19	40
Ohio	20	4	3	*13	45,215	965	1,028	0	0	0	0	0	2	0	2	15	19
Indiana	26	9	0	17	48,269	1,508	1,247	1	0	0	8	9	53	0	2	243	298
Kentucky	16	10	0	6	27,198	1,086	945	0	0	0	1	1	26	0	1	90	117
Illinois	59	22	0	37	136,776	2,646	2,462	1	0	0	15	16	52	0	3	570	625
Michigan	8	2	1	5	21,201	826	941	0	0	0	3	3	33	0	6	282	321
Kansas	76	37	6	‡33	257,328	3,613	3,069	1	0	1	10	12	103	0	12	601	716
Nebraska	12	5	0	7	37,769	130	33	1	0	0	5	6	7	0	4	57	68
Oklahoma	132	75	6	§51	499,703	5,045	4,007	0	0	1	17	18	146	6	19	616	787
Texas	270	180	8	82	1,203,270	15,186	12,386	7	2	0	47	56	473	46	106	2,473	3,097
North Central (Dist. 7-B & 9)	87	48	0	*39	268,531	4,627	4,139	5	0	0	18	23	208	2	29	967	1,206
West (Dist. 7-C & 8)	73	68	0	5	393,501	4,552	3,020	0	0	0	4	4	90	3	6	488	587
Panhandle (Dist. 10)	8	7	1	0	23,641	827	892	0	0	0	0	0	1	0	2	19	22
Eastern (Dist. 5, 6, & 6-P)	13	9	1	3	54,075	1,062	785	0	1	0	2	3	15	6	3	185	209
Gulf Coast (Dist. 2 & 3)	44	20	4	20	278,702	2,142	1,822	2	0	0	13	15	79	21	41	374	515
Southwest (Dist. 1 & 4)	45	28	2	15	184,820	1,976	1,728	0	1	0	10	11	80	13	25	440	558
Louisiana	40	17	7	16	214,690	2,251	2,174	0	0	0	4	4	47	16	6	205	274
Northern	24	9	5	10	86,956	1,210	1,312	0	0	0	3	3	13	3	2	105	123
Southern	16	8	2	6	127,734	1,041	862	0	0	0	1	1	34	13	4	100	151
Arkansas	6	5	0	1	20,551	377	308	0	0	0	0	0	10	0	0	83	93
Mississippi	4	2	0	2	27,041	286	315	0	0	0	1	1	10	2	0	108	120
Southeastern States	4	2	0	2	19,094	56	43	0	0	0	2	2	1	0	1	30	32
Montana	0	0	0	0	0	246	239	0	0	0	0	0	2	0	0	43	45
Wyoming	14	2	0	12	51,197	556	556	0	0	0	6	6	23	0	1	89	113
Colorado-Utah	4	1	0	3	9,725	105	130	0	0	0	2	2	6	0	3	61	70
New Mexico	7	6	1	0	30,282	562	473	0	0	0	0	0	11	1	3	51	66
California	47	40	0	7	199,066	1,668	2,386	2	0	0	7	9	29	0	4	354	387
Miscellaneous	2	0	0	2	12,814	51	26	0	0	0	2	2	0	0	0	26	26
Total United States	765	425	38	302	2,895,586	39,633	35,576	13	2	2	130	147	1,034	70	195	6,019	7,318
Total previous week	809	415	60	334	3,141,608	....	....	22	0	5	142	169	1,021	68	193	5,889	7,171
Total December 2, 1949	702	404	50	248	2,411,483	....	....	9	1	0	92	102	861	75	178	5,141	6,255

Service wells included: *2, †4, ‡5, §1.





DAILY AVERAGE PRODUCTION FOR WEEK

DAILY AVERAGE PRODUCTION FOR WEEK

	Dec. 2 crude oil	B. of M. Nov. demand	Nov. 25 crude oil
Alabama	2,400	1,600	2,350
Arkansas	81,350	88,000	79,400
California	954,200	950,000	955,300
Colorado	77,400	67,000	75,700
Eastern	56,000	65,000	64,250
Florida	1,475	1,400	1,850
Illinois	169,500	184,000	171,800
Indiana	29,900	31,000	29,600
Kansas	294,650	306,000	315,600
Kentucky	28,800	30,000	29,800
Louisiana	584,625	606,000	582,200
North Louisiana	114,350	.....	114,200
South Louisiana	470,275	.....	468,000
Michigan	44,100	47,000	44,700
Mississippi	104,850	110,000	104,800
Montana	22,500	24,000	22,600
Nebraska	5,500	5,000	5,400
New Mexico	130,900	150,000	130,925
Oklahoma	494,400	466,000	491,200
Texas	2,495,500	2,350,000	2,535,200
Dist. 1 (Southwest)	31,150	.....	31,200
Dist. 2 (Southwest)	146,625	.....	148,725
Dist. 4 (Southwest)	225,800	.....	225,350
Dist. 3 (Gulf Coast)	438,375	.....	443,450
Dist. 5 (Eastern)	42,050	.....	42,850
Dist. 6 (Eastern)	96,375	.....	98,050
East Texas field	284,900	.....	291,000
Dist. 7-C (West)	71,550	.....	71,450
Dist. 8 (West)	847,050	.....	871,600
Dist. 7-B (W. Central)	72,100	.....	71,875
Dist. 9 (N. Central)	149,525	.....	149,650
Dist. 10 (Panhandle)	90,000	.....	90,000
Utah	3,400	4,000	3,200
Wyoming	178,900	184,000	178,200
Total United States	*5,760,350	5,670,000	5,824,075
Change from prev. week, down	63,725		
Canada	102,225	.....	102,260

Total U. S. production January 1-December 2 .. †1,814,434,825 bbl.
Same period last year (crude plus cond.) ..... 1,706,339,395 bbl.

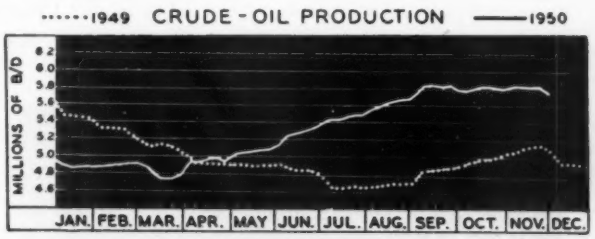
*Not including 101,370 bbl. condensate. †Including 32,813,795 bbl. condensate.

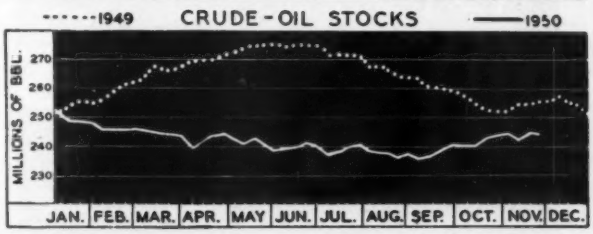
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

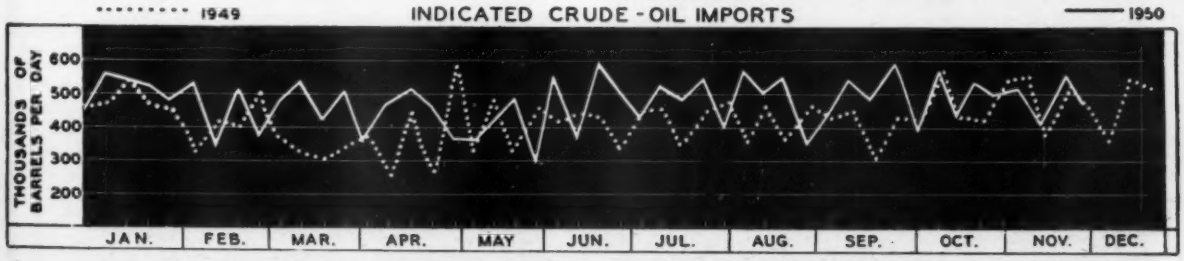
(Thousands of barrels)

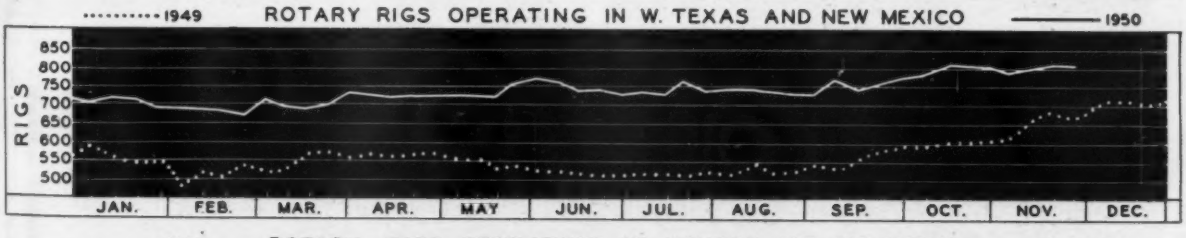
	Nov. 25, 1950	Nov. 18, 1950	Nov. 26, 1949
Pennsylvania Grade	2,221	2,255	3,031
Other Appalachian	1,343	1,409	1,865
Illinois, Indiana, Michigan	10,334	10,245	11,681
Arkansas	2,507	2,704	2,632
Louisiana	14,373	14,182	13,483
North	2,801	2,723	3,005
Gulf	11,572	11,459	10,478
Mississippi	2,053	2,056	2,408
New Mexico	6,876	6,844	7,286
Oklahoma and Kansas	38,108	37,731	37,094
Texas	118,440	118,949	117,372
East Texas	13,830	13,744	16,853
West Texas	46,556	45,934	44,306
Texas Gulf	28,711	29,568	30,068
Other Texas	29,343	29,703	26,145
Rocky Mountain	11,398	11,435	13,956
California	30,235	30,641	37,458
Foreign	6,609	6,665	8,143
Total	244,497	245,116	256,409

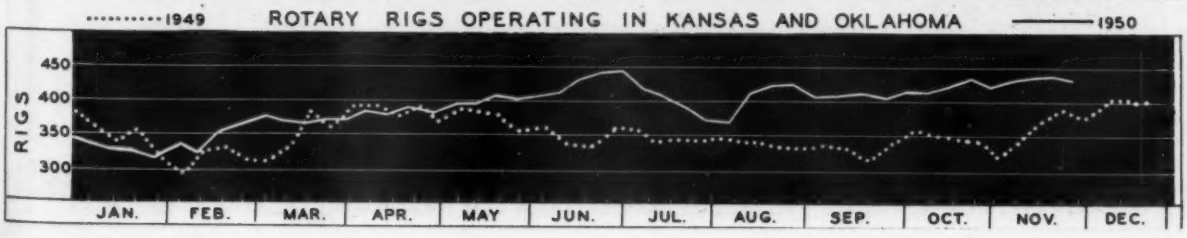
*Bureau of Mines.











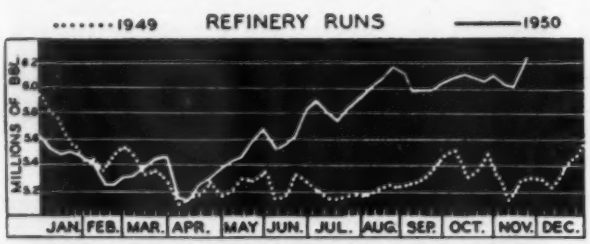
A.P.I. REFINERY REPORT, NOVEMBER 25

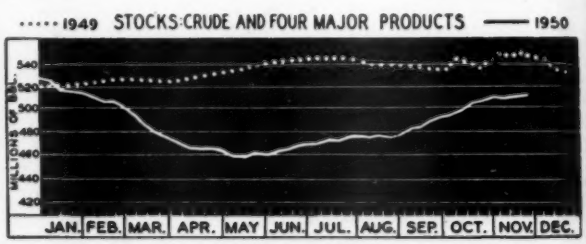
(Thousands of barrels)

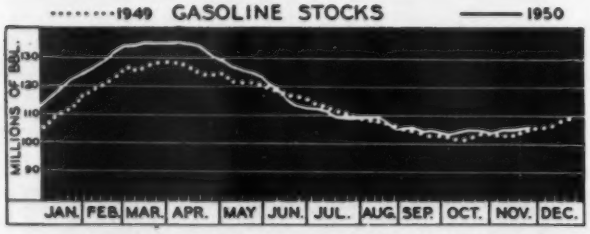
District—	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline†	Kerosine	Distillate	Residual
East Coast	903	325.7	33.0	229.3	203.7	23,991	11,098	28,697	11,673
Appalachian:									
District 1	110	49.1	7.0	13.0	10.9	2,738	446	1,028	427
District 2	59	28.4	4.6	8.9	14.1	1,078	232	271	192
Ind., Ill., Ky.	1,168	613.4	62.9	204.0	171.1	21,903	5,971	14,556	5,130
Okla., Kans., Mo.	512	278.4	17.9	111.8	57.6	10,635	1,424	9,205	1,349
Inland Texas	202	143.3	10.1	32.7	36.9	3,632	509	1,324	687
Texas Gulf Coast	1,507	653.9	117.4	323.6	247.6	16,239	4,090	13,893	6,066
La. Gulf Coast	504	228.2	59.4	103.6	60.1	6,671	2,674	3,565	2,266
N. La. and Ark.	73	29.9	7.6	14.7	9.1	2,175	578	840	175
Rocky Mountain:									
New Mexico	15	7.7	.4	2.9	3.9	86	25	41	32
Other Rocky Mtn.	214	91.3	9.4	39.1	47.7	2,863	384	1,857	759
California	971	386.0	11.1	143.7	347.3	14,413	860	11,491	16,810
November 25, 1950	6,238	2,835.3	340.8	1,227.3	1,210.0	106,424	28,291	86,768	45,566
November 18, 1950	6,002	2,814.6	331.3	1,175.9	‡1,254.7	105,468	28,382	87,117	‡45,600
November 26, 1949	5,331	2,600.6	290.4	995.9	1,157.7	104,917	26,069	91,795	67,087

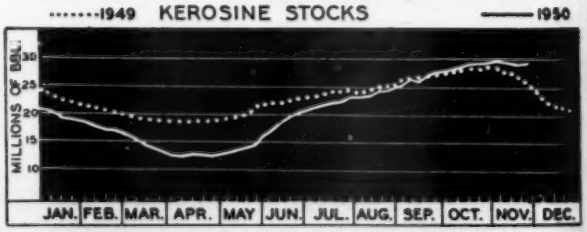
Bureau of Mines, November 1949	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
	760	322.0	26.7	158.7	190.4
	92	41.7	5.8	12.4	9.5
	55	26.5	3.5	5.8	11.0
	932	492.5	62.7	144.7	163.9
	426	240.7	15.4	87.6	58.9
	207	143.2	12.7	25.6	41.8
	1,279	615.5	104.0	253.2	250.4
	443	228.9	53.6	103.6	59.4
	81	31.9	7.8	11.1	16.2
	12	7.0	.4	1.8	3.3
	162	76.2	6.5	25.7	32.9
	844	367.8	10.0	132.2	342.7
	5,293	2,593.9	309.1	962.4	1,180.4
	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....

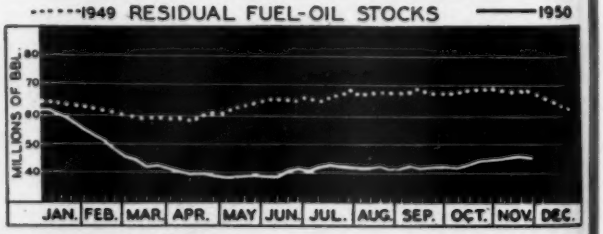
*At refineries including natural blended. †Finished and unfinished. ‡Revised.

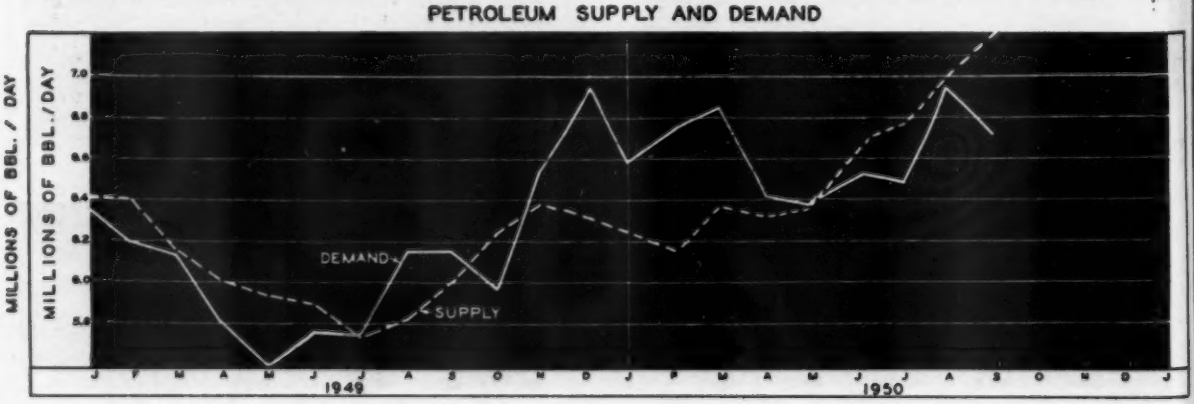











PETROLEUM SUPPLY AND DEMAND
MILLIONS OF BBL. / DAY
MILLIONS OF BBL./DAY
DEMAND
SUPPLY
J F M A M J J A S O N D J F M A M J J A S O N D J
1949
1950

CRUDE PRICES
GRAVITY SCHEDULE

	Signal Hill, Calif.‡	Oklahoma, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.76	....	....	....
19-19.9	1.83	....	....	....
20-20.9	1.90	$2.25	....	$2.12
21-21.9	1.97	2.27	....	2.14
22-22.9	2.04	2.29	....	2.16
23-23.9	2.10	2.31	....	2.18
24-24.9	2.17	2.33	$2.56	2.20
25-25.9	2.24	2.35	2.58	2.22
26-26.9	2.31	2.37	2.60	2.24
27-27.9	2.37	2.39	2.62	2.26
28-28.9	2.42	2.41	2.64	2.28
29-29.9	2.48	2.43	2.66	2.30
30-30.9	2.54	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.64	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	....	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947.

‡Standard Oil Co. of California.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

East Texas†	$2.65
Kettleman Hills, California*	2.77
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	4.10
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°. †35° and above.

MOVEMENT of heating oils from Mid-Continent refineries has been at midseason level since the last cold wave. Suppliers report that instructions for immediate shipment of No. 1 and No. 2 fuel on the last day of November and the first 2 days of December represented in many cases as much as a third of the customer's estimated requirements for December. Even if a part of this flood of orders is accounted for by delayed November buying, it has given December a good start toward an all-time record demand.

The tank-car situation is tight enough to give the buyer with cars some advantage in the market.

Residual fuel for railroads in December is set at the generally posted low of $1.65 a barrel in the Group 3 area. However, most marketers agree that cold weather and high demand for residual could tighten the market to the point where railroads would have to increase the price to get needed supplies. In most cases the December contracts call for flat prices for residual, but a general increase in the heavy-fuel market would probably require some adjustment in these contract prices.

Higher coastwise tanker rates are adding to the firmness of all East Coast product markets, even gasoline. High gasoline demands and advancing replacement costs have eliminated the 12-cent low for barge deliveries of regular gasoline in New York Harbor. Latest reported coastwise rate was Maritime Commission base plus 110 per cent for a clean vessel. This would represent transportation costs of 1.64 cents a gallon for gasoline and 1.9 cents for No. 2 fuel. Almost all sales are restricted to movement against contracts since replacement costs are above open-market bids because of firm Gulf prices and high tanker rates.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotation of leading suppliers as of December 4, 1950. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10¼-10½	12.5-12.75	10¾-11
Premium gasoline, 86-88 octane	11¼-11½	13.5-13.75	11½-12
42-44 w.w. kerosine	8⅞-9⅛	10-10.1	8½-9
No. 2 straw fuel oil	8⅛-8⅜	9-9.2	7½-8
No. 6 residual	$1.65-1.75	$2.15-2.30	$1.75-1.85

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	6⅜	5⅞	6⅛
Grade 18-55	7.65	7.15	7.4

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	12.5-13.5
750 vis., No. 3-4 neutral	14.75-16
2,000 No. 5-6 neutral	16.5-19

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock 0-10 pp.	27-28
200 vis., No. 3 neutral, 0-10 pp.	16.5-18.5

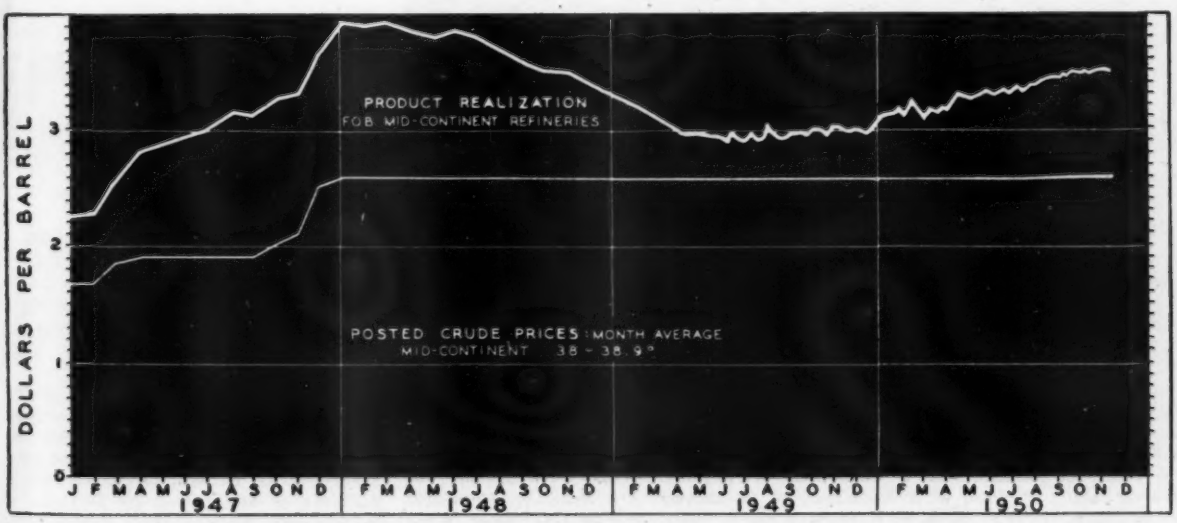
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	29.5
180 vis., 0 p.t. neutral	30.5

WAX

Mid-Continent

132-134 A.M.P.	5.8


PRODUCT REALIZATION
F.O.B. MID-CONTINENT REFINERIES
POSTED CRUDE PRICES: MONTH AVERAGE
MID-CONTINENT 38 - 38.9°
DOLLARS PER BARREL
0
1
2
3
J F M A M J J A S O N D
1947
F M A M J J A S O N D
1948
F M A M J J A S O N D
1949
F M A M J J A S O N D
1950

In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.49 for week ended November 25, $3.52 for previous week, and $3.02 for November 1949.

EQUIPMENT MEN . . . in the News

Fluid Packed Pump Holds Managers Meeting in Tulsa

SIDNEY SHUMAN

The division managers of Fluid Packed Pump Co. recently met at the Tulsa Hotel, Tulsa, to discuss plans for expanding sales and service facilities for Oilmaster Pumps. The meeting was attended by J. B. Reilly, president general manager; M. S. Black, plant manager; Sidney Shuman, general sales manager; Assistant Sales Manager Glen W. Peters; G. R. Newbolt, manager of Oklahoma and Kansas; C. D. Newbolt, manager of Gulf Coast, East Texas, Louisiana, Mississippi, and Arkansas; B. G. Wing, manager of the Eastern division, and Dee A. McDaniels, manager of North Texas, West Texas, New Mexico, and the Panhandle.

Kelly Named President of American Brakeblok

William T. Kelly, Jr., has been appointed president of American Brakeblok Division of American Brake Shoe Co., according to an announcement by Board Chairman William B. Given, Jr.

In addition to his new duties, Kelly will continue as president of the Kellogg Division, manufacturers of air compressors and paint spray equipment. Vice president Maynard B. Terry, located at the division's headquarters in Detroit, will continue in charge of Brakeblok sales.

Since joining the company in 1928 as a molder's helper at the National Bearing Division plant in St. Louis, Kelly has had wide experience in the company's division. He became general purchasing agent in 1940 and was successively vice president and director of the Canadian Ramapo Division, president of Engineering Castings Division, and vice president of Brake Shoe Co.

Engel, Anderson Advanced By Four Wheel Drive

M. O. Stockland, director of the sales division of The Four Wheel Drive Auto Co., has announced the appointment of H. G. Engel, manager of FWD's Western sales zone, as office sales manager and the appointment of V. M. Anderson, district sales supervisor in northern Illinois, to the vacated zone managership.

H. G. ENGEL

V. M. ANDERSON

Joining the FWD sales organization in 1922, Engel served for short periods in home-office sales work but has spent most of his time on the road. He was appointed manager of sales zone I in 1945. His territory, at first 12 Midwestern states, was later enlarged to include all states west of the Mississippi River and Illinois.

Anderson joined the FWD organization as a service man in 1936 and was soon made manager of the service repair department. Transferred to the sales division, he was appointed district sales supervisor with headquarters in Salt Lake City, Utah. In FWD's postwar sales organization, Anderson was named district sales supervisor for Illinois.

Schlumberger Conducts First Well Logging Study Group

The first in a series of regional study conferences in well logging was conducted by Schlumberger Well Surveying Corp. from October 30 through November 3 in the Rice Hotel, Houston. The conference was attended by a group of technical men selected from among Schlumberger's customers and an equal number of the company's engineers.

The conference covered topics in the general fields of well-logging theory, interpretatiton, and applications. Individual problems of the visiting group were discussed with the Schlumberger technical staff.

Schlumberger engineers with their guests, attending the first regional study group on well-logging problems are: (front) W. O. Matejowsky; R. D. F. Anderson, Atlantic Refining Co., San Antonio; T. L. Hird; A. L. Draper, Humble Oil & Refining Co., Corpus Christi; J. B. Justus, The California Co., Natchez, Calif.; Jim Lewark, Carter Oil Co., Mattoon, Ill.; G. E. Hendrickson, Cities Service Oil Co., Oklahoma City; Lee Petty, L. H. Reynolds; Lee Meltzer, United Gas Corp., Shreveport; D. M. Cowart; G. K. Sievers, Carter Oil Co., Wichita. Second row: R. G. Sweeney, Arkansas Louisiana Gas Co., Shreveport; J. S. Coombs; R. Wills, Magnolia Petroleum Co., Houston; D. T. Wise, The Texas Co., New Orleans; C. H. Coldwell, Sun Oil Co., Dallas; C. R. Edgecomb; S. E. Coombs; Fred McMillan; Donald Loehendorf, Magnolia Petroleum Co., Houston; H. B. Baskette; Carl Schwab; G. R. Brown, The Texas Co., Midland, Tex.; W. G. Barfield, W. T. Illrey, Humble Oil & Refining Co., New Orleans; J. C. West; W. A. Eickmeyer; W. W. Shoquist; J. L. Heath, Jr. Third row: W. W. Goode, Jr.; T. R. Elliott; W. H. Hartwell; W. B. Emery, Ohio Oil Co., Casper, Wyo.; J. C. Byers, Sun Oil Co., Colorado City, Tex.; E. R. Atkins, Union Oil Co. of California, Los Angeles; G. H. Thomen; Garret; Max Taves, Richfield Oil Corp., Los Angeles; R. P. Ridley, The Texas Co., Houston; A. Bland, Imperial Oil, Ltd., Calgary; B. H. Clark.

Panhandle Steel Announces Two Personnel Changes

John V. Boyce, president of Panhandle Steel Products Co., Wichita Falls, Tex., has announced two changes in company personnel.

John P. Collier is now vice president and sales manager, succeeding Thomas J. Lawless, Jr., and A. B. Phillips is chief engineer, having succeeded J. G. Brown. Other company officials as announced by Boyce are as follows:

R. C. Stanford, vice president; F. L. Durham, treasurer; Harry L. Holt, plant auditor and purchasing agent;

W. G. Hilley, assistant to the president; and C. C. Hughes, plant superintendent.

Gates Named Assistant Sales Manager of Weco

J. W. GATES

John W. Gates has been promoted to assistant sales manager of Well Equipment Manufacturing Corp., according to announcement received from Tracy T. Word, Jr., sales manager.

Gates joined Well Equipment as shop foreman in 1946. For the past 2 years he has been a division manager and prior to that time was Gulf Coast representative. Well Equipment is the manufacturer and distributor of Weco unions, blocks, compounds, and Chiksan swivel joints.

Insul-Mastic Appoints Two New Directors

Clifford Off, Jr., and Harry E. Rapp have been appointed to the board of directors of Insul-Mastic Corp. of America, whose offices are in Pittsburgh, Pa.

Off is sales manager of the company. He joined Insul-Mastic in 1946 and is a graduate of Princeton University.

Rapp joined Insul-Mastic in 1947 and now holds the position of technical director. He was formerly associated with Carbosite Co. of Greensburg, Pa. Rapp is a graduate of Northwestern University.

Edward Valves Appoints European Sales Agent

Edward Valves, Inc., East Chicago, Ind., has appointed Societe Audco Belge S. A., Brussels, Belgium, as Edward sales representative in continental Europe. Edward builds cast and forged-steel valves for the power, petroleum, processing, and general industrial fields.

All sales contacts will be under the supervision of Fred O. Spitzer of the Audco Belge sales staff, who will travel through Belgium, Denmark, France, Holland, Italy, Luxembourg, and Switzerland.

Societe Audco Belge is a subsidiary of Audley Engineering Co., Ltd., Newport, Shropshire, England, which is licensed to build and market Nordstrom lubricated plug valves in the British Isles and on the continent.

Nordstrom, with headquarters in Pittsburgh, is a division, and Edward Valves, Inc., of East Chicago is a subsidiary of Rockwell Manufacturing Co. of Pittsburgh.

Atlas Moves to Springfield

The first complete engine from the Atlas Imperial Diesel Engine Co., Oakland, Calif., is shown here arriving at The National Supply Co. engine division at Springfield, Ohio. National Supply recently added to its horsepower range of diesel engines with the purchase of the assets of Atlas Imperial. The company will manufacture, sell, and service Atlas engines and parts in addition to its line of Superior diesel, gas and dual-fuel engines.

R. F. Attner Boosted by Manning, Maxwell & Moore

R. F. Attner has been appointed manager of valve distributor sales of Manning, Maxwell & Moore, Inc., A. W. Coleman, general sales manager, has announced.

Since 1945 assistant to the sales manager for Hancock Valves at Watertown, Mass., Attner joined the company in 1922 as an inventory clerk, later moving into a production department. In 1929 he was made assistant office manager in Boston, and in 1937, chief sales correspondent for Hancock Valves.

Miller Electric to Expand Sales Program in 1951

An expanded sales and advertising program for 1951 was decided upon at a sales conference of the division sales managers of Miller Electric Manufacturing Co., Appleton, Wis., in a recent 5-day session.

In addition to sales the sessions covered sales promotion, advertising, public relations and publicity activities, the conference being in charge of Niels C. Miller, president of the company.

Brooks Leaves S.S.C. to Form New Consulting Firm

C. C. Brooks, formerly with Seismograph Service Corp., of Tulsa, recently resigned to form a new company, Geophysical Consultants, Inc., of which he is president. The new firm's headquarters are in Tulsa.

Geophysical Consultants is staffed with experienced personnel and has acquired the latest improved seismic instruments and new motorized units, and is fully equipped to give complete geophysical work, both from interpretational and operational angles.

Brooks has been in seismograph work for 20 years and was with Seismograph Service for the past 13 years. His foreign experience took him to the Dutch East Indies, and later to

O-C-T Holds Annual Sales Meeting

O-C-T Center Tool Co.'s annual sales meeting, held recently in Houston, was attended by O-C-T sales representatives from Louisiana, Oklahoma, and Texas. In the group above are: (standing) C. T. Jones, C. L. Braswell, R. L. Gammill, C. R. Sinclair, R. L. Clonlnger, A. C. West, Jr., C. B. Wright, Jr., J. A. Clay, Ira C. Wells, M. E. Hunter, E. G. Amunds n, H. C. Stewart, A. M. Taylor, J. C. Norton, M. Davenport, and T. J. Dacy; (seated) G. U. Berg, Jr., W. L. Wilcox, F. Richard, R. E. Galloup, J. E. Edwards, Walter Burke, and F. T. Smith.

the Middle East where he was in Iraq, Iran, Palestine, and Cyprus. Prior to his service with Seismograph Service, he was with the geophyhical department of Amerada Petroleum Corp.

Whessoe to Manufacture Lummus Heat Exchangers

By a recently concluded agreement between Lummus Co. of New York and Whessoe, Ltd., of Darlington, England, heat exchangers conforming to Lummus designs and thermal ratings are to be manufactured under license at Darlington, England, by Whessoe, Ltd.

Heat-exchange plants designed with the latest American experience and fully guaranteed as to performance and manufacture can in consequence be purchased in Great Britain by oil, chemical, and power undertakings for their operations anywhere in the world outside the United States. Whessoe, Ltd., has already built many Lummus heat exchangers under previous arrangements.

Kellogg of Canada Opens New Plant at Edmonton

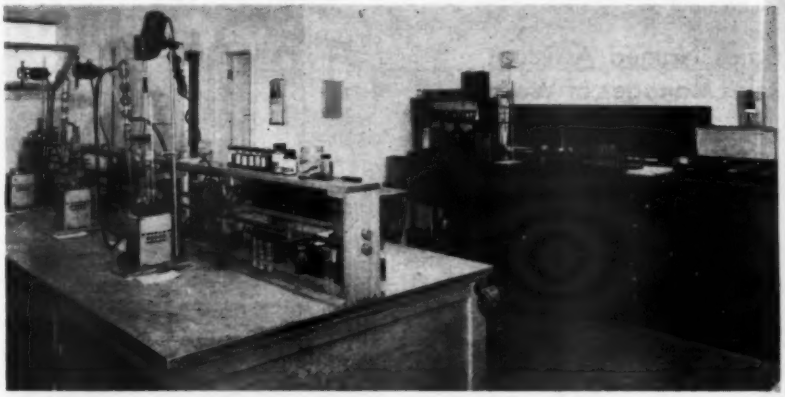
In order to serve the rapidly expanding requirements for specialty power and process piping in western

The sections shown at Canadian Kellogg's plant are ready for delivery to a mill of Columbia Cellulose Co., Ltd., near Prince Rupert, B. C.

Canada, Canadian Kellogg, Ltd., engineers and fabricators, have opened a new pipe-fabricating plant at Edmonton, Alta. The shop, which began operations last summer, is operated by technicians and craftsmen specially trained in advance techniques employed by the company's United States affiliate, The M. W. Kellogg Co.

The shop has an approximate capacity of 400 tons a month, much of which is critical high-temperature, high-pressure alloy piping. It is now turning out piping for three complete new refineries being constructed in Edmonton and Winnipeg.

Visco Moves California Facilities to Larger Quarters



Visco's service and research laboratory at Long Beach, Calif.

In order to provide better, faster service for California customers, Visco Products Co., Inc., of Houston, has recently moved its West Coast office and laboratory to newer and larger quarters at 1519 South Street, Long Beach, Calif.

While the company's sales and service representatives are all equipped with portable equipment for field analyses of emulsion-breaking problems, they occasionally encounter crude emulsions that resist treatment and require more complete laboratory study for the development of a successful chemical treatment. Since California emulsions often differ from those of other areas, and usually prove too unstable to permit shipment to the main laboratory at Sugarland, Tex., the California laboratory was established in January 1944.

In addition to on-the-spot service to California producers, this laboratory conducts research and development work aimed at producing the very best possible chemical treatments for the particular types of crudes encountered in California. Visco's assistant chief chemist, Earl T. Kocher, directs both the routine service and the research activities of the west coast laboratory, and is assisted by a service technician who acts as a liaison man between the laboratory and the field staff.

To assure that speed in deliveries does not lag behind the promptness of chemical analysis service, the company has arranged warehousing facilities in Long Beach and Bakersfield which cut to a minimum the shipping time required for delivery of Visco chemicals to California oil producers.

Powers Erecting New Office Factory Building

Scheduled for completion next summer at the time of the company's sixtieth anniversary is the new Powers Regulator Co. plant on its 13-acre site in Skokie, Ill. Sessions Engineering Co. of Chicago are the architects and engineers for the building which will contain 130,000 sq. ft.

The new building is 575 ft. long. The two-story office, test, and research laboratory section will be 290 ft. wide and is to be constructed.

Products to be manufactured in this new plant include the company's extensive line of automatic temperature and humidity controls for heating and industrial processes.

Catalytic Construction Elects Two Officers

The board of directors of Catalytic Construction Co. has announced the election of two new officers. John A. Schumacher was named comptroller, a position formerly held by W. Graham Jamison who was elected vice president and treasurer at an earlier meeting. The post of assistant treasurer, formerly held by Schumacher, has been filled by F. W. Adams, who in addition to these new duties will continue as manager of the field accounting division.

Both Schumacher and Adams have been associated with Catalytic Construction Co. since its formation, having come to the organization from Sun Oil Co.

L. M. Rich Directs PROTO And Subsidiary Sales

Lawrence M. Rich has been appointed vice president and general sales manager of Plomb Tool Co., Los Angeles, it has been announced by Morris B. Pendleton, president. In his new capacity, Rich directs all sales and related activities for PROTO tools. He also supervises the sales operations of the company's subsidiaries.

Rich originally joined the company in 1929 and was eastern sales representative until 1932. He then served the Marlin-Rockwell Corp. for 8 years

(Continued on page 163)

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$12.00 a column inch one issue . . .
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EQUIPMENT FOR SALE

USED ROTARY AND CABLE TOOL DRILLING TOOLS, WIRE LINES, E. A. KELLY, BOX 861, OKLAHOMA CITY. PHONE 5-6407.

WELL equipment. New and used spudders, rotaries, core drills, all sizes and types. Cable tools, drill pipe, bits, pipe. Fishing tools rented. Everything for well service. Pressey & Son, Pueblo, Colo.

WILSON Mogul Draw Works Unit with compound powered by International UD-18 Motor complete with 55-foot double telescoping mast ready to use. Two Traveling Blocks and Hooks, Rotary, 4-foot Substructure. All in good condition. Real Bargain at only $6000.00. Contact D. C. Bonnet Trucking Co., New Iberia, La.

BOILERS FOR SALE: 18 Code Oil Field Boilers, 50 to 87 H.P., 100 to 200 Lbs. W.P., Operated Under Hartford into 1948, Not Fired Since. Located on Leases Vicinity Pampa, Texas. Offered Subject to Prior Sale. $500.00 to $700 each, as is, where is. Contact Max Harbison, Kewanee Oil Company, Pampa, Texas.

#45 Star Spudder, Caterpillar Motor, new Kohler Light Plant, Chevrolet Truck, Trailer, complete tools. Rig and equipment in Kansas. Write J. N. Fetzer, 644 Diversey Parkway, Chicago 14, Ill.

FOR SALE: Twin GMC 6-71 Diesel engine 330 HP at 2100 RPM, brand new in original wraps. Full details from McLean Mfg. Co., Inc., 253 Main Ave., Passaic, N. J.

FOR SALE

4—Large 6 x 6 Trucks, 240 H.P. Engine—excellent condition.

321 West Douglas
Wichita 2, Kansas

Several Army Surplus 4½" x 6" Gaso Duplex 1860 Pumps—two piece skid mounted with Chrysler 8 cylinder engines. Will sell pumps only or complete units about half price.

H. H. COFFIELD
ATTN.: W. H. Orr
Phones: 132—Rockdale, Texas
A-66064—Houston, Texas

PIPE FOR SALE

5000′ H40 5½" OD, 14# New Seamless casing, 8 RT, Range 2, f.o.b. Pitts. Area.

4000′ H40 5½" OD, 14# New Seamless casing, 8 RT, Range 2, f.o.b. Cen. Mich.

25000′ Class C used (A1) External upset tubing, 10 VT, Range 2, f.o.b. Cen. Mich.

8000′ J55 7" OD, 20# Used (A1) Seamless casing, 8 RT, Range 2, f.o.b. Cen. Mich.

MICHIGAN CARLON PIPE COMPANY

20120 Livernois Detroit 21, Mich.
DIamond 1-1400

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO
Box 107, Red Fork Station, Tulsa, Oklahoma

1—4′0" ID x 40′-6" x 1¼" thick tower; 1—7′-0" ID x 57′ x ½" thick tower, 19 CI bubble trays; 1—7′-6" ID x ½" thick tower, 25 CI bubble trays; 1—2′-6" dia. x 40′-3 compartment tower, 15 bubble trays. Tri-State Supply Company, Box 610, Mt. Pleasant, Texas.

PIPE LINE EQUIPMENT for sale: Swing Crane, Trackson Model CT-9, practically new, fits International TD-9. $1000.00. Woodard Truck & Tractor Co., Brady, Texas.

FOR SALE: At Oklahoma City, Oklahoma, large stock used air tools reclaimed from modernizing refinery job as follows: Close quarters drills, grinders, chipping and riveting hammers. Other tools, both new and used, including open end and box construction wrenches, etc. Inventory available Cities Service Oil Company, H. D. Patridge, Bartlesville, Oklahoma.

4,000 G.P.M. Fluor Atmospheric Cooling Tower. Good condition, bronze hardware. Being released from service due to expansion program. The Derby Oil Company, Box 1030, Wichita, Kansas.

FOR SALE

600

Fisher Gas Regulators

L. R. KERSHAW

Muskogee, Oklahoma

EQUIPMENT FOR SALE

DRILLING rig located at Greggton, Texas, yard, and consisting of complete steam rotary drilling rig without drill pipe, including 2 120 H.P. oil well boilers, 1 6" Union Tool unitized draw works, 1 12x12 Ajax roller bearing steam engine, 1 14½x7½x18 Ideal mud pump, Ideal rotary table, swivel, crown block, traveling block, etc. Contact Rudco Oil & Gas Company, Box 2018, Tyler, Texas.

GENERATORS for diesel driven electric power, 156 KVA, 240/480 volt, 3 phase, 60 cycle, 900 RPM, complete with exciters and control cabinets, connections for parallel operation of two or more generators, brand new, manufactured by Electric Machinery Manufacturing Company, $2000.00 each, seven available, Northern Ordnance Incorporated, Minneapolis, Minnesota.

CASING—5½ and 7" No. 1 grade, lapweld and seamless.
TUBING—2", 2½", and 3" regular and upset.
WATER WELL CASING—5⅝" and 6¼" Attractively priced.

D. A. MORITZ CO.
9th & B&O, Braddock, Pa.

PIPE FOR SALE

800′ 10¾" OD, 32#, R1 Used Lapweld Casing 8V Th.
3500′ 8⅝" OD, 24#, R1 Used Lapweld Casing 8V Th.
13000′ 7" OD, 17#, R1 Used Lapweld Casing 10V Th.
17000′ 2⅜" OD, 4½# R1, Used Lapweld Tubing 11½V Th.
20000′ ⅝" Used Sucker Rods, ⅞ P&B.

Call

NEIL C. MATHEWS
Athens, Ohio
Phones 640 and 738

FOR SALE
EXCELLENT USED SEAMLESS STEEL TUBING

Thoroughly cleaned—GOOD AS NEW—for many practical purposes. Can be galvanized, if desired.

						Nearest pipe size
40,000′	1 1/16"	OD x .125"	Wall	1.4#	P/FT 14′-24′	(1")
50,000′	1½"	OD x .140"	Wall	2.1#	P/FT 14′-24′	(1¼")
50,000′	2"	OD x .140"	Wall	2.7#	P/FT 14′-24′	(1½")
45,000′	2¼"	OD x .145"	Wall	3#	P/FT 14′-24′	(2")
12,500′	3"	OD x .150"	Wall	3.8#	P/FT 6′-18′	(2½")
5,000′	3½"	OD x .150"	Wall	4.1#	P/FT 8′-18′	(3")
10,000′	4"	OD x .150"	Wall	5.4#	P/FT 8′-20′	(3½")

PHONE COLLECT SIDNEY 1791 FOR PRICES AND PLACEMENT OF ORDERS.

A. J. STRUBEL
SIDney 1791 . . . 4946 Murdoch, St. Louis, Mo.

XUM

EQUIPMENT FOR SALE

3—160 CUBIC FOOT Air Compressors. Diesel: Gasoline. J. C. Morrison, Midwestern Drillers, Liberal, Kansas. Phone 2441.

FOR SALE: 300 Amp Westinghouse welding machine powered by 6-BK Waukesha engine. Completely overhauled. Less than 50% of new price. Melton Supply Company Box 1360, Seminole, Oklahoma.

FOR SALE: Practically new 24-L Bucyrus-Erie oil well spudder, powered with model 306 Buda Motor, complete with tools, lines, and steel doghouse. Perrine and Perrine, Box 67, Salem, Illinois. Telephone No. 1064.

4" DRILL PIPE

7,500′ Located Oklahoma City
12,000′ Located Natchez, Miss.
Lot Oklahoma City J&L Bottleneck 17#
Lot Natchez Hinderliter Joints 16.6#
Used good condition.

MID-STATES PIPE & SUPPLY CO.
Ph. 2-9128 **Tulsa, Okla.**

FOR SALE

9—230 H.P. Bessemer Type 10 Engines with compressors, Steel Buildings, Valves, and Fittings complete for installation. Located Salem, Illinois Oilfield.

ENGLE PETROLEUM, INCORPORATED
Box 655, Evansville, Indiana
Telephone 5-5179

STANDARD BLACK PIPE

In Good Used Condition

2"—45,000 ft.
3"—25,000 ft.
4"—35,000 ft.
6"—10,000 ft.
9"—10,000 ft.

Single Random Lengths.
Immediate Delivery.

Recently removed from refinery.

WRITE—WIRE—PHONE

Sonken-Galamba Corp.
2nd and Riverview (X-658)
Kansas City 18, Kansas

EQUIPMENT FOR SALE

COMPLETE Slimhole Rotary Rig, mounted on Dodge truck, strong Derrick. Ball-bearing throughout, strong, sturdy. 5X10½ mounted mudhog pump, Mission equipped. 10 barrel steel water tank. 700 ft. 12 lb. drill pipe 1500 feet water or oil rig. Money maker, two men operate. $5,500 cash. Box 106, Seminole, Oklahoma.

FOR SALE: Sullivan Drilling Rig Model 200 RT on truck complete with 2500 feet practically new drill pipe, good condition. $27,500. James F. Gray, 15th Floor Praetorian Bldg., Dallas 1, Texas.

FOR SALE: Large stock of centrifugal, simplex and duplex steam pumps, steam and gas turbines, Clark, Bessemer & Cooper compressor cylinders in 20" stroke. List available upon request. Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

FOR SALE: 12,500′ used 2⅞" O.D. seamless upset tubing, 10-thread, P.O. Box 1581, Phone 5-3545, Tulsa, Oklahoma.

FOR SALE: 8 New 20,000 gal. welded tanks. 12—8,000 gal. tank cars. Darien Corp., 60 E. 42nd St., N.Y., N.Y.

NEW CASING

129,000′ of 5½" O.D. x 15.5# SMLS, API J-55, LT&C, 8 Rd. Th. Made in Germany. Delivery—April 1950, CIF any U.S. port. Duty paid. War risk insured. Guaranteed inspection by U.S. inspection bureau available. Subject to prior sale. Prices of portions or entire quantity on application. **Box D-791, The Oil and Gas Journal, Tulsa, Oklahoma.**

LARGE QUANTITIES

6" #460 Crane Gate Valves
4" & 6" Victualic Couplings
All NEW ready for shipment.
Attractively priced for quick sale.

NEWMAN'S, INC.
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LINE PIPE

900,000′ New 16", 18", 20", 22", 24" & 26" OD Welded, API spec.
500,000′ 5½" up to 14" pipe.
6,000 tons Armor plate, 1" to 8" thick, various sizes, available immediately.

ERVIN HOHENSEE CO.
1333 Connecticut Ave., Wash., D. C.
Phone: ADams 5000

EQUIPMENT FOR SALE

AMPHIBIOUS airplane: Eight place twin-engine Grumman Goose for sale or lease. Formerly owned by large oil company, excellent condition. Richard French. Genesee Airport, R.D. 2, Rochester, New York.

EQUIPMENT WANTED

WANTED to buy 36L Bucyrus Drilling Machine in good condition. J. M. Berry, 239 S. Pine, Nowata, Okla.

RECORDING GAUGES WANTED
State pressure and if daily or longer. R. L. Pattinson, Aylmer, Ontario, Canada.

HELP WANTED

DRILLER ON new Bucyrus and Star spudder. Work near Great Lakes Area. Big hole experience necessary. Box D-777, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED GEOLOGIST—Senior Geologist qualifications. Imagination, good subsurface background; particularly South Texas and Gulf Coast, who desires position with active, aggressive independent company. Location: San Antonio. Replies confidential. Box D-779, The Oil and Gas Journal, Tulsa, Oklahoma.

NATIONALLY known manufacturer has good proposition for men who have retired from oil production or oil refining. No investment required. Write Box D-788, The Oil and Gas Journal, Tulsa, Oklahoma.

MUD Engineer wanted for work in California. Give age, educational background, details of experience, and marital status in first letter. Reply Box D-784, The Oil and Gas Journal, Tulsa, Oklahoma.

OFFICE MANAGER—CHIEF ACCOUNTANT

Excellent opportunity for man experienced and qualified in oil accounting with well-established, integrated Oil Company. Send photo with data sheet.

Box D-767, The Oil and Gas Journal
Tulsa, Oklahoma

LINE PIPE FOR SALE

50,000′ 2⅜" OD 3.75# & 4# Good Used Lapweld T&C Range 1 Line Pipe.
49,167′ 4" OD x .130" Wall Seamless, 5.4#, Used as sweet gas line, taken up in 30′ Lengths. Above ground and available for immediate inspection and delivery, FOB Mobeetie, Tex.
50,000′ 6⅝" OD 18.97# Excellent Grade Used Lapweld, Machine Cleaned, Beveled Ends, 20′ RML.
5,000′ 6⅝" OD 18.97# Strictly No. 1 Seamless, 45′ Lengths, Plain Ends.
5,000′ 6⅝" OD x .188" Wall 12.89# New Spiral Weld, 50′ Lengths, Beveled Ends.
8,000′ 10¾" OD 34# Good Used Lapweld, Plain Ends, 20′ Lengths.

CASING & TUBING

10,000′ 2⅜" OD 4# Good Used Lapweld Range 1 Tubing with New 10 Rd. Thread and Collars.
8,000′ 5½" OD 10# Recond. Seamless Casing, New 11½ V-Tds. & New Collars 5⅛" Long (Recommended for Shallow Wells).
5,500′ 7" OD 20# Good Used Lapweld Range 1 T&C Casing, 10 V-Thd.
5,000′ 8⅝" OD 25# Good Reconditioned Casing, 8 V-Thd., T&C, Range 1
5,000′ 10¾" OD 35.75# Good Used Lapweld T&C Casing, Range 1, 8 Thread

OTHER SIZES OF LINE PIPE, SEAMLESS TUBING IN SUITABLE SUBSTITUTE SIZES FOR STANDARD PIPE (EXCELLENT FOR GAS, GATHERING AND FLOW LINES), CASING AND TUBING AVAILABLE FOR IMMEDIATE DELIVERY.

FOR FURTHER INFORMATION, WIRE OR PHONE AT ONCE

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SIDney 1791 . . . 4946 Murdoch, St. Louis, Mo.

ENGINEERS

Major oil company operating in the Middle East requires graduate engineers in the following classifications:

SENIOR PROCESS ENGINEER
GEOPHYSICS ENGINEER
GEOLOGIST (SEISMOGRAPH)
ASST. GEOLOGIST (SUBSURFACE)
ASST. CHEMICAL ENGINEERS
ASST. CHEMIST (ANALYTICAL)
GEOLOGICAL DRAFTSMAN

Also we have positions for experienced and inexperienced civil, mechanical, electrical, construction and highway engineers.

If interested, write giving full outline of personal and employment history.

Box D-728
The Oil and Gas Journal
Tulsa, Oklahoma

HELP WANTED

MANAGER-OPERATOR for natural gas system. Excellent opportunity for young engineer with gas experience. State age, experience, salary expected and when available. Write P.O. Box 155, Quitman, Miss.

ELECTRICAL ENGINEER

As assistant supervisor in major East Coast refinery. Excellent opportunity for the right man. Background of maintenance and construction in petroleum or other process industry desirable. Age 28-40. Write giving age, exp. and salary desired. Box D-787, The Oil and Gas Journal, Tulsa, Oklahoma.

MECHANICAL ENGINEER

New large oil pipeline company requires mechanical engineer to handle design, supervise construction, and devise maintenance procedures on all pump station equipment to 5000 HP, not including electric equipment. Station specifically includes 2000 HP maximum IC engine and centrifugal pump. Complete familiarity with high pressure oil piping required. Men under 35 preferred. Include full professional details and minimum salary first letter. Box D-781, The Oil and Gas Journal, Tulsa, Oklahoma

HELP WANTED

SEISMOLOGIST for work in Venezuela. Ten years' experience with four years' interpretive work, family status, salary commensurate with experience and ability. Give full details in reply to The Atlantic Refining Company, P. O. Box 2819, Dallas, Texas.

PETROLEUM ENGINEER (JUNIOR) with at least 1 year production or drilling experience to work in Venezuela. Single status preferred. Give full details in reply to The Atlantic Refining Company, P. O. Box 2819, Dallas, Texas.

SALES ENGINEERS
OPERATIONS SUPERVISORS
PERFORATOR OPERATORS

Only Experienced Men Need Apply

WRITE ONLY

WELEX JET SERVICES, INC.
3909 Hemphill Street, Fort Worth 9, Tex.

WANTED

Experienced Oil Field Machinery and Engine Salesman needed in Mid-Continent Area. Write giving qualifications and experience.

Box D-790
The Oil and Gas Journal
Tulsa, Oklahoma

HELP WANTED

Graduate Engineers

GOOD OPPORTUNITIES

for

CHEMICAL ENGINEERS: Five to ten years' experience in Chemical Operations or Development. Work in Application of unit operations, evaluations and economic studies leading to cost reduction. Must be graduate, free to travel.

ENGINEERS FOR UNIT OPERATIONS: Five years' experience in the fields of Agitation, Drying or Grinding, Blending and Screening. Specialized knowledge of Heat Transfer, Fluid Flow and Mass transfer are desirable. Must be graduate. Consultation work.

INSTRUMENTATION ENGINEERS: Five or more years of progressively difficult experience in Instrument Research Development or Design. Must have broad and thorough knowledge of instrument theory and application. Should have some knowledge of Chemical Equipment and its operation. Must be graduate.

POWER ENGINEERS: Must have five to fifteen years' experience in some of the following: operating, testing and maintaining power plant equipment, supervising power plant operations, making cost and evaluation studies, heat balance work, power cost accounting, design and layout of power plants, and the selection and installation of power equipment. Must be graduate.

AIR CONDITIONING ENGINEERS: At least 7 years' experience in selection and operation of heating, air-conditioning, ventilating and refrigeration equipment. Well versed in the theory of thermodynamics, fluid flow and heat transfer. For consulting evaluation, and economic operation services. Must be graduate.

MAINTENANCE ENGINEERS: Five to ten years in planning maintenance work, establishing manpower and material requirements, scheduling and controlling work. Must be thoroughly familiar with Machine and Hand Tools used in Plant Maintenance Work. Must have supervised persons doing maintenance work. Must be graduate. For consultation work.

Give experience, education, age, references, personal history, salary received and salary expected. Please be complete and specific.

ALL INQUIRIES WILL BE CONSIDERED
PROMPTLY AND KEPT
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E. I. du Pont de Nemours & Co., (Inc.)
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ENGINEERS, DESIGNERS, DRAFTSMEN

All Grades

Good positions open in San Francisco and Los Angeles — experienced engineers, draftsmen and designers for work on chemical, industrial and power projects. Refinery, process, mechanical, structural and electrical engineers are needed; also qualified layout men, designers and detailers for electrical, structural, mechanical and piping squads.

Write stating experience, education, age, references, salary expected. Applications held in confidence; prompt consideration.

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ROOM 10

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220 BUSH STREET
SAN FRANCISCO, CALIF.

VACANCIES EXIST WITH MAJOR OIL COMPANY HAVING OPERATIONS IN SEVERAL COUNTRIES IN SOUTH AMERICA FOR:

Chief Reservoir Engineer

Senior Petroleum Engineer

Petroleum Engineering Laboratory Analyst

Wellsite Mud Engineer

Geologists

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Salaries offered are dependent upon qualifications and experience and are payable in U. S. currency.

Interested parties should submit essential details of qualifications. All replies, which will be held in the strictest confidence, should be addressed to:

Box D-792
The Oil and Gas Journal, Tulsa, Oklahoma

XUM

HELP WANTED

PRODUCTION MAN WANTED
If you want to make a change, we can pay good salary. Man can also buy leases and royalties. Production is approx. 6000 ft. North Texas. Age 40-50. All applications and information held confidential. Write Box 1824, Oklahoma City, Okla.

FOREIGN and Domestic Oil Employment Directory covering the oil industry, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 2503, Tulsa, Okla.

ASSISTANT GEOLOGIST for work in Venezuela on single status, degree in geology plus two years experience with core drill or related work, salary commensurate with experience and ability. Give full details in reply to The Atlantic Refining Company, P. O. Box 2819, Dallas, Texas.

ELECTRICAL ENGINEER: New large oil pipeline company requires electrical engineer to handle design, construction and devise maintenance procedures, all classes equipment to 5-KV switch gear. Some familiarity with sub-stations to 110-KV, 5000-KVA desirable but not required. No communications or electronics involved. Include full professional and personal details and minimum salary, first letter. Job is permanent. Box D-761, The Oil and Gas Journal, Tulsa, Oklahoma.

POSITION Available February 1, 1951, Assistant or Associate Professor with Masters degree or higher in Petroleum Engineering to teach reservoir engineering courses in rapidly growing school with excellent laboratory and other facilities. Qualifications will determine salary, but will be comparable to industry. Location Southwest. Box D-765, The Oil and Gas Journal, Tulsa, Oklahoma.

CRUDE Oil Treating Engineer, minimum 2 years' experience, college graduate preferred. Headquarters Oklahoma City, territory covers 10 states. Salary commensurate with experience. State education, background, experience, etc. Reply Sohio Petroleum Co., Industrial Relations, Skirvin Tower, Oklahoma City, Oklahoma.

WANTED: Chemical Engineers for process development and process design on petroleum refining and chemical processes. Prefer individuals with several years' experience in one or both of above fields. Southwest location. Write F. J. Heller, Research and Development Department, Phillips Petroleum Co., Bartlesville, Oklahoma.

ENGINEERS, EXECUTIVES, TECHNICAL MEN, SALARIED POSITIONS—$3600 TO $30,000. THIS CONFIDENTIAL SERVICE FOR OUTSTANDING MEN WHO DESIRE A CHANGE OF CONNECTION, WILL DEVELOP AND CONDUCT PRELIMINARY NEGOTIATIONS WITHOUT RISK TO PRESENT POSITION. SEND NAME AND ADDRESS FOR DETAILS. TOMSETT ASSOCIATES, 1204 BERGER BLDG., PITTSBURGH 19, PA.

CHEMIST OR CHEMICAL ENGINEER

For interesting Light Products Research & Development Section Rocky Mountain Refinery. Young college graduate preferred. Send photo with data sheet.

Box D-764, The Oil and Gas Journal, Tulsa, Oklahoma

ENGINEER WANTED

Major company located in central Ohio desires graduate mechanical Engineer with several years experience in Spudder design. Give age, educational background and complete details of experience. Our employes know of this ad. Reply to Box D-773, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

REGISTERED MECHANICAL ENGINEER desires to invest in and assume engineering position with pressure vessel and/or tank fabricator for Tulsa area. Box D-739 The Oil and Gas Journal, Tulsa, Oklahoma

PURCHASING AGENT
15 Yrs. Exp. Includes Processing, Engineering. Available.
Box D-783, The Oil and Gas Journal, Tulsa, Oklahoma

SITUATIONS WANTED

MECHANICAL Engineer: 15 years Crude Pipe Line Experience, machinery maintenance, Station Design for Gas Engine, Diesel and Electric Drive. Married. Age 38. Now employed as Plant Engineer. Desires Change. Box D-590, The Oil and Gas Journal, Tulsa, Oklahoma.

LUBRICATING OIL Chemist, Compounder, Technical Adviser. 15 years experience. May I submit my qualifications in detail? Southwest or West. Box 771, The Oil and Gas Journal, Tulsa, Oklahoma.

SEISMOLOGIST with three years experience in the field (party chief) and three years reviewing field work in Head Office, desires position in Canada. Still under contract, ready to start new employment next January. Write Box D-769, The Oil and Gas Journal. Tulsa, Oklahoma.

DRILLING INDUSTRY Specialist desires position as branch manager, representative, or heavy administrative responsibility. Thoroughly trained and experienced. Age 36. Box D-776, The Oil and Gas Journal, Tulsa, Oklahoma.

PLANT MANAGER of LUBRICATING GREASE AND OIL PLANT desires connection with progressive oil company. Technical background, extensive experience in plant control and management. Box D-768, The Oil and Gas Journal, Tulsa, Oklahoma.

COMBUSTION ENGINEER—16 years experience in design, manufacture, erection and sales of industrial furnaces, ovens, dryers, atmosphere generators and heating processes. Capable of full responsibility. Box D-793, The Oil and Gas Journal, Tulsa, Oklahoma.

SUPERINTENDENT-PROCESS supervisor, engineer, experience in complete refinery operations, desires change. Eighteen years experience in distillation, cracking, reforming, polymerization, treating, blending. Proven administration and technical ability. Box D-794, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOPHYSICIST, 37, M.S. Degree, 14 years experience in seismic work including Poulter method; desires supervisory position with more opportunity for advancement. Available January 1st. Box D-795, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico. Personal interview by appointment is desired. Makin Drilling Company, Box No. 131, Ph. No. 131, Hobbs, New Mexico.

DRILLING Contractor operating in West Texas and New Mexico desires to contact small or medium-sized independent oil company who needs an operating manager. Personal interview desired. Twenty years experience in all phases of the oil industry. Address replies to Box D-644, The Oil and Gas Journal, Tulsa, Oklahoma.

EXECUTIVE ASSISTANT: Specialized Material Control and Purchasing. 20 years' experience in oil business. Available January 1st. E. L. Perry, Jr., Box 831, Borger, Texas.

DESIRE POSITION as chief operator or supervisor. 18 years' experience on all phases of refinery operations. Can also set up re-refining lube plant. Box D-785, The Oil and Gas Journal, Tulsa, Oklahoma.

SENIOR ENGINEER, PH. D., experienced design petroleum plant and equipment, instrumentation, utilities; procurement; supervision layout and drafting; versatile, aggressive, resourceful, seeks responsible position with refinery, chemical plant or contractor. Box D-786, The Oil and Gas Journal, Tulsa, Okla.

PETROLEUM ENGINEER: B.M.E. and M.S. degrees, 18 months' extensive training and experience in six states with a major, 23 years old, married, presently employed, desire position north of, east of, or in Illinois. Box D-789, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE OR CHARTER

FOR SALE OR CHARTER: 83' TWIN SCREW DIESEL BOAT, IDEAL FOR SURVEY OR CREW. B. O. SCOTT, 5033 FOURTH STREET, PORT ARTHUR, TEXAS.

ROYALTIES

SPOT CASH PAID FOR PRODUCING ROYALTY. SMALL TO LARGEST BLOCKS IN SETTLED OR OLD PRODUCTION ONLY. Oil Specialists since 1934. GERBER & CO., 120 WALL STREET, NEW YORK, N. Y.

DEEDED ROYALTIES
San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington New Mexico.

MONTANA ROYALTIES
Millions of acres now leased by world's major companies, with huge drilling play in prospect. For booklet describing Montana geology and oil development, write Landowners Royalty Company, Box 1225 Great Falls, Montana.

LEASE AND DRILLING BLOCKS

U. S. LANDS in Colorado can be filed for Government oil lease in developing area. Good opportunity. Small Expense. Write S. W. Pressey, Pueblo, Colorado.

10,000 ACRE block in Roundup (Central Montana) area. Promising structure, some development done, limited production. $2.50 per acre and 2½% override. For particulars write P. O. Box 937, Great Falls, Montana.

FOR SALE: OIL LEASE; 160 acres. Average daily production 15 bbls. On water flood. Write Albert Vincent, 310 So. Silver St., Paola, Kansas, or call 384w.

FOR SALE: 10,000 acres of land in San Luis Valley, Colorado. Opportunities for development unlimited. All minerals intact. Irrigation can be developed. A. T. Long, Star Route, San Marcos, Texas.

DRILLING contract wanted. Have 60,000 acre solid block commercial leases in northeast North Carolina. All new leases. J. W. Phillips, P.O. Box 7043, Tulsa, Oklahoma.

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Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited

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PATENT ATTORNEYS

PATENT Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommell, Registered Patent Attorneys, Suite 418, 815-15th Street, N.W., Washington 5, D. C.

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908. Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing. Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa 3, Oklahoma.

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SMALLEST, prettiest Miniature Tri-Cone Rock Bit made. Less than one-half inch diameter. Cones turn, will not come out. Gold or nickel plate. On tie chain clasps, ladies' lapel pins, strap type for watch fobs and ring type for charms.

Nickel plate $4.00
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Lots of 12 or more $1.00 less per bit. Check, Money Order or C.O.D.

H. McGAUGHEY
P.O. Box 11063, Houston, Texas

EQUIPMENT MEN

(Continued from page 158)

as New York branch manager. From 1946 to 1950 he was director of sales of Durkee-Atwood Co., Minneapolis.

Becker Named Western Representative for Morse

R. J. Howison, general sales manager of Morse Chain Co., division of Borg-Warner Corp., Ithaca and Detroit, has announced that Carlton R. Becker has been recently appointed as Morse Western factory representative.

He will supervise the sales of Morse mechanical power transmission products in the 11 states west of and including Montana, Wyoming, Colorado, and New Mexico. His headquarters are in Pasadena, Calif.

Becker formerly was associated with J. W. Minder Chain & Gear Co., Los Angeles, Morse Chain distributor.

Key Licenses Foreign Firms to Make Fittings

To further expand its facilities, Key Co., East St. Louis, Ill., has announced the licensing of three foreign companies to manufacture Key return-bend fittings for the oil refinery and allied chemical industries. Under this arrangement, all Key designs, research, and engineering facilities are made available to the three licensees.

The companies selected are: Lake & Elliot, Ltd., Braintree, Essex, England; Societe Francaise des Constructions, Babcock & Wilcox, Paris, France; Compagnia Tecnica Industrie Petroli, Rome and Milan, Italy.

By these agreements, the skill and experience of companies well known in the United States and abroad are combined to make available on a world-wide basis, Key return-bend fittings.

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CALENDAR OF EVENTS

The Calendar of Events will be found on page 43 of this issue, immediately following the feature "They Say."

Reilly-Benton to Distribute Kaylo-Insulation Products

Kaylo Division, Owens-Illinois Glass Co., Toledo, has announced the appointment of Reilly-Benton Co., Inc., New Orleans, as distributors of its Kaylo heat insulation for the area of Louisiana and Mississippi.

Kaylo heat insulating block and pipe covering are made of hydrous calcium silicate.

Reilly-Benton is solely a wholesale distributor of insulation materials and accessories. The firm maintains sales representatives at New Orleans, for Louisiana, and Jackson for Mississippi.

Electric Products Appoints Kansas City Agent

The Electric Products Co., of Cleveland, has appointed Power Equipment Co. as its representative in the western counties of Iowa and Missouri, the Panhandle counties of Texas, and the states of Arkansas, Oklahoma, and Kansas. With offices in Kansas City, Mo., Power Equipment will handle all the industrial lines of Electric Products.

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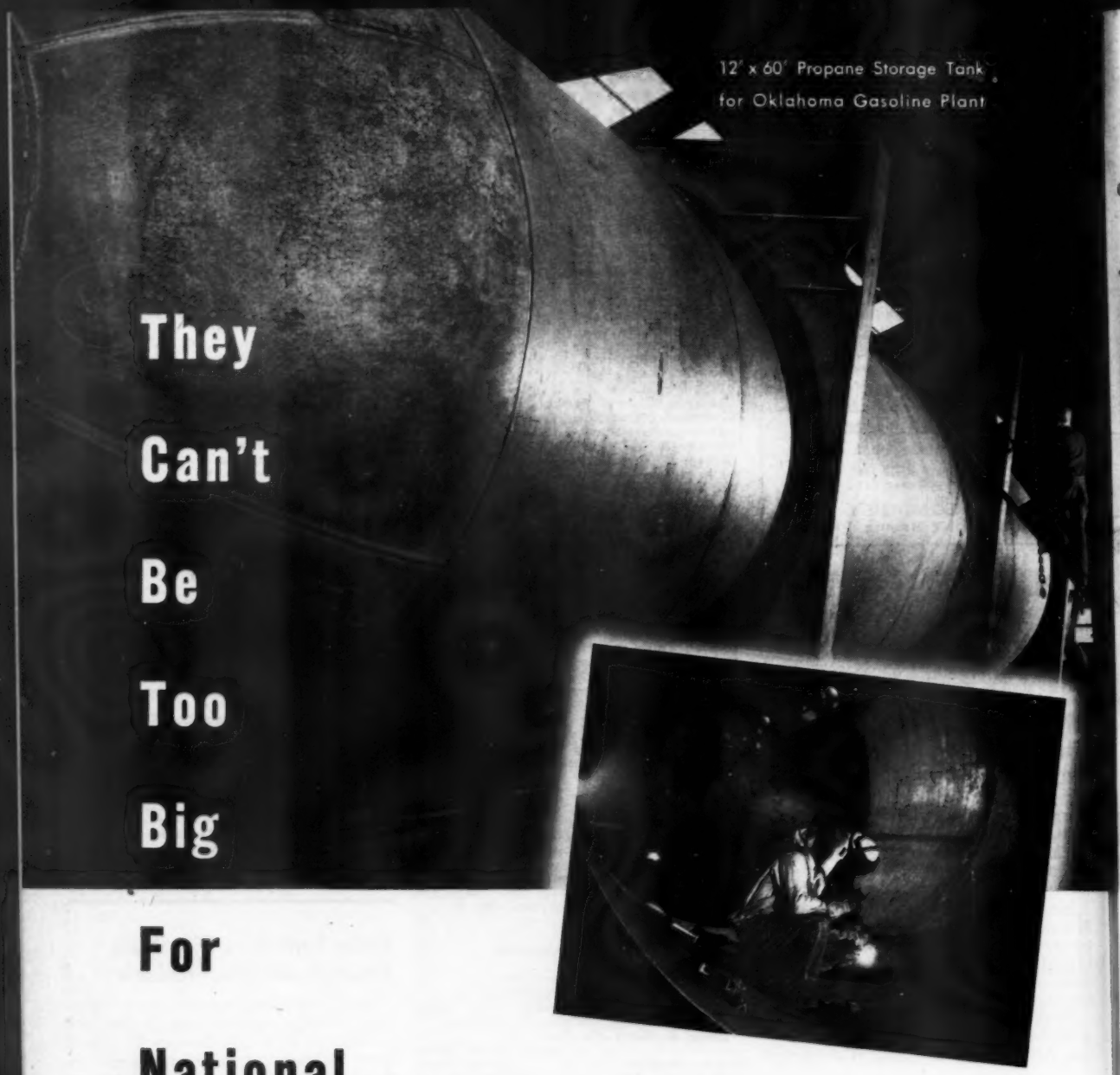

12' x 60' Propane Storage Tank for Oklahoma Gasoline Plant

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Serving the oil industry all over the world, the large and up-to-the-minute facilities of the National Tank Company assure its customers the best in design, workmanship and materials. Years of experience in producing oil field equipment, a highly-trained staff of engineers and employees and 33 field warehouses and service branches were recently supplemented by a large plant expansion. Two 50-ton cranes, six 10-ton cranes, seven 5-ton cranes, a 400-ton hydraulic press and a huge annealing furnace (15 by 15 by 100 feet) are only some of the new facilities for processing and producing the latest scientific equipment for National's customers.

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TULSA, OKLAHOMA

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American Iron FLASH WELDED Tool Joints are the latest addition to our line of rotary tool joints! They're designed right — made right — from start to finish. In our final manufacturing process, gigantic controlled surges of electricity flash weld these tool joints to drill pipe — forming integral units!

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